THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CX. No. 2449.] LONDON, APRIL 19, 1910. [62ND YEAR. PRICE 6d.

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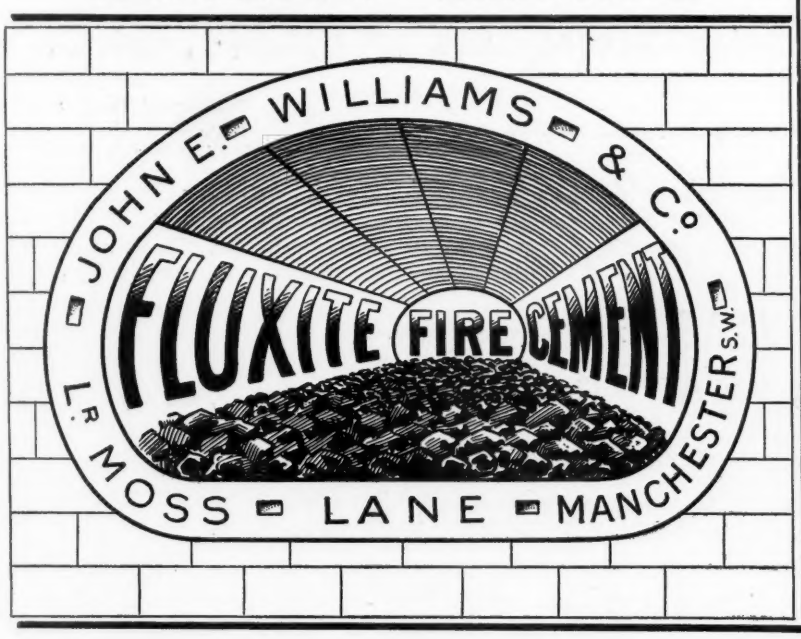

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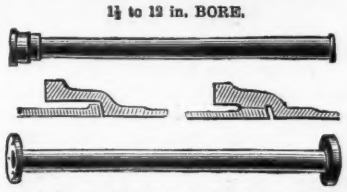

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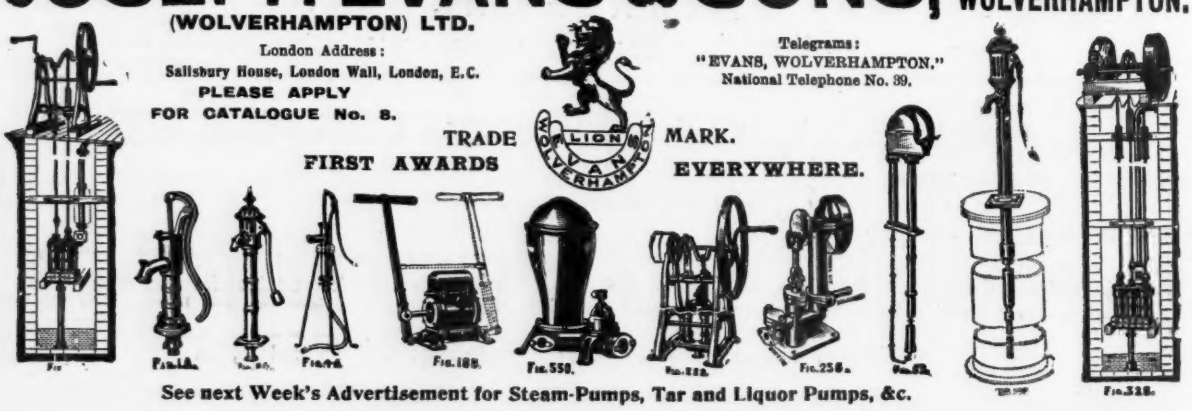

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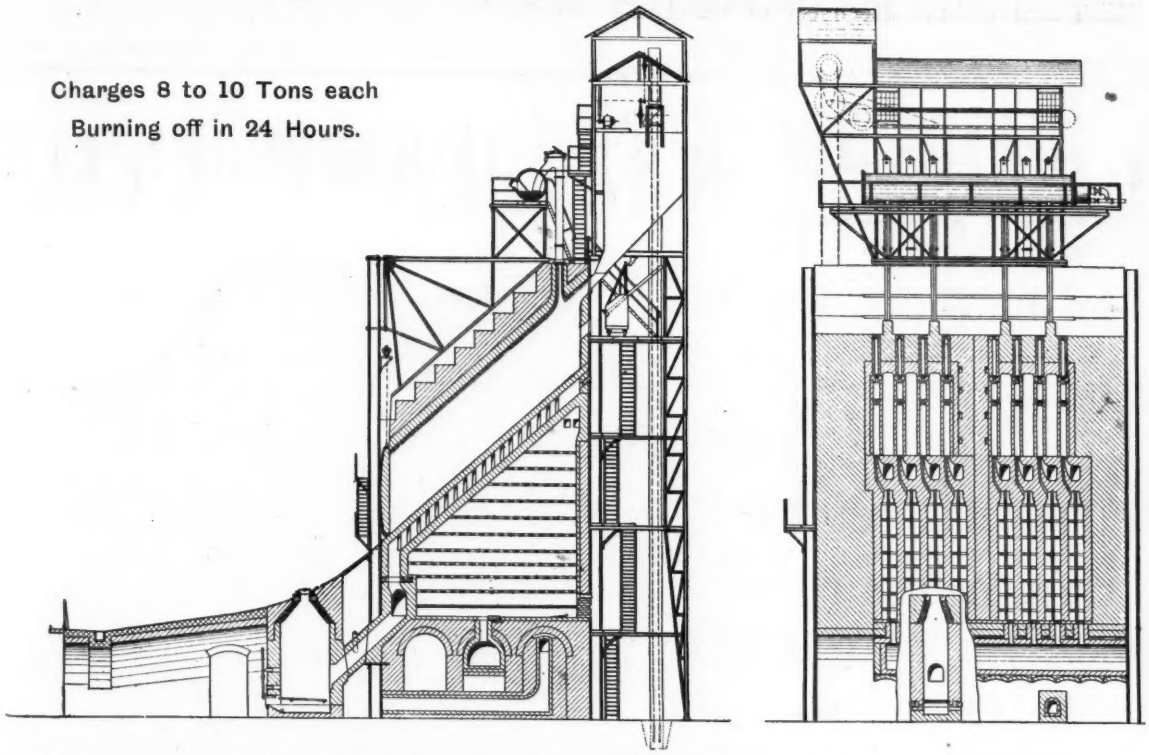

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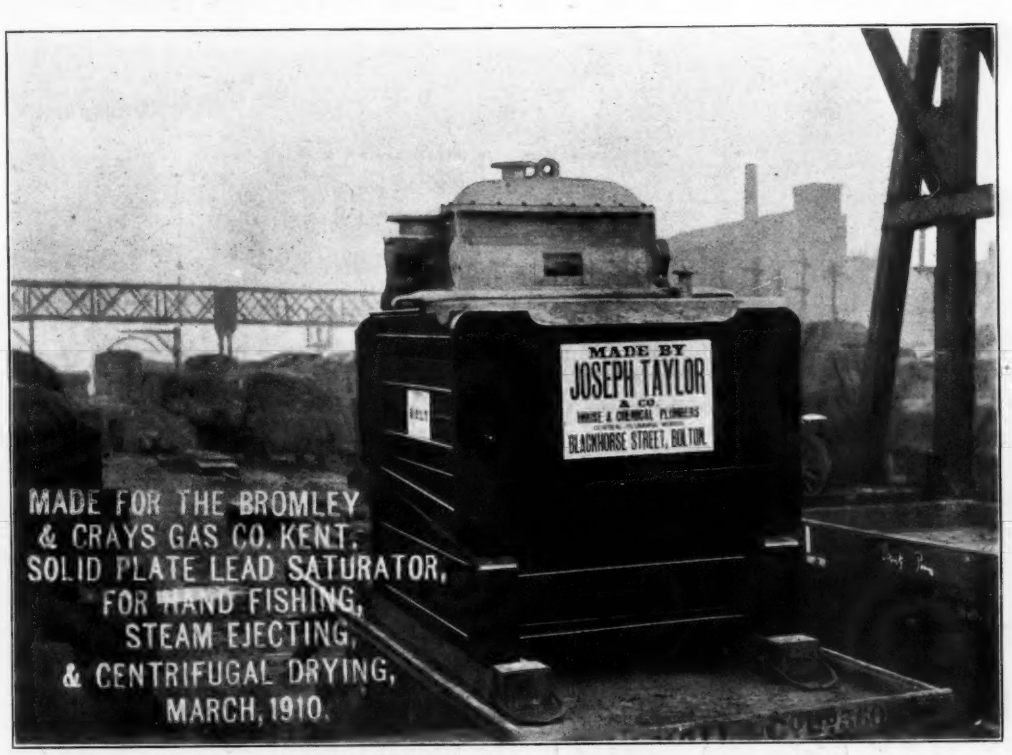

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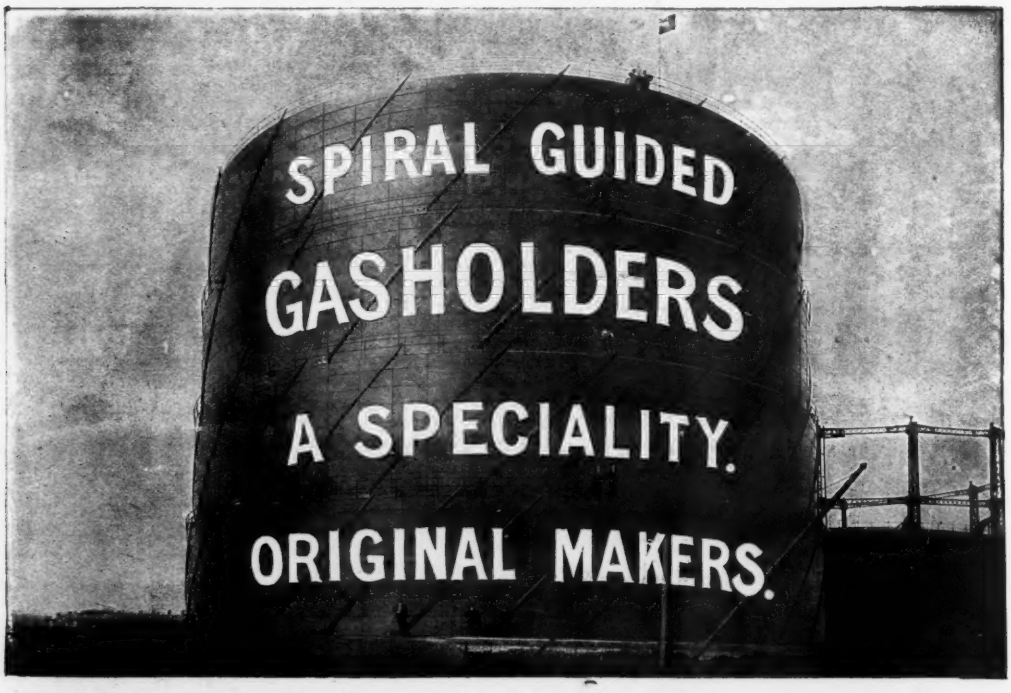

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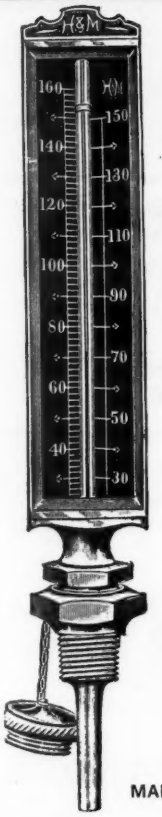

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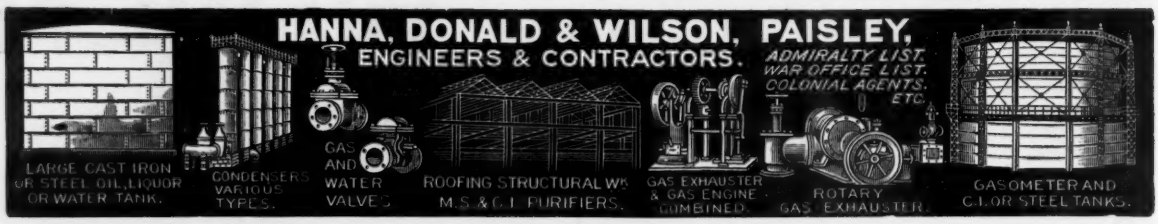
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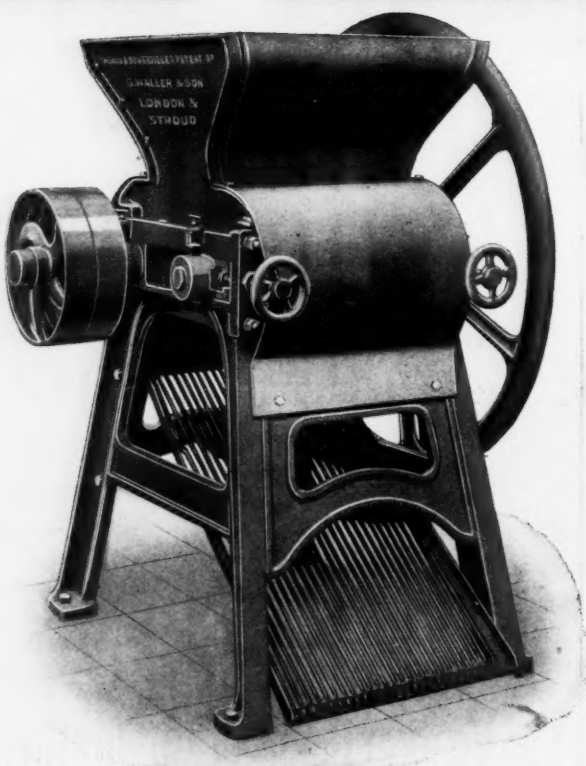

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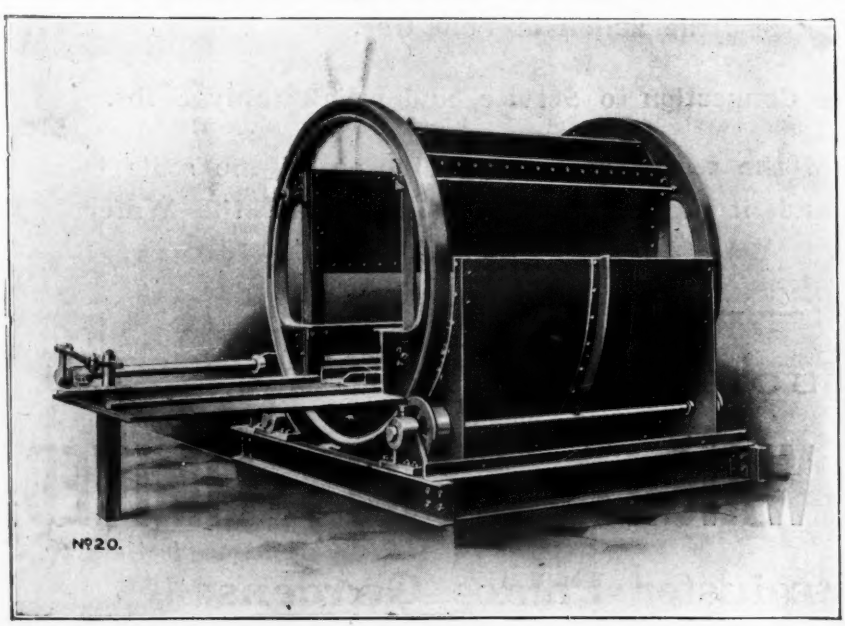

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CX., No. 2449.—TUESDAY, APRIL 19, 1910.

EDITORIAL NOTES—GAS, &c.

Ousting Arc Lighting in the West-End.

A SIGNAL victory has been scored by gas for public lighting purposes in the West-end of London; and we venture to say that—on the lines of an absolute equality in the matter of tendering, with illumination as the basis of the contract, and heavy penalties attaching to default in the supply of the stipulated illumination—nothing has ever been done before that shows in so conclusive a manner that gas applied under and by modern method and means is the most economical and efficient agent for street purposes. Electricians may rail against gas, may misapply the term "retrograde" to advance in gas lighting more modern even than the flame arc lamp, but all such railing and misrepresentation will not avail them when, as in this instance, preference rests solely on the business terms of efficiency and economy.

And not only in the matters of finance and efficiency do we regard the victory scored as of importance, but in that of locality. The streets from which electric arc lamps will be evicted are in the very heart of all West-end life and traffic —pedestrian and vehicular. In the scheme, Pall Mall (the first gas-lighted street in the country—1807) very appropriately returns to gas as now utilized in one of its most modern forms. But Piccadilly Circus is the centre of the area in question; and branching from it Piccadilly to St. James' Street is included in the adopted scheme, St. James' Street, Waterloo Place, Regent Street, Haymarket, Shaftesbury Avenue, and Coventry Street to Leicester Square. So that standing in the Circus, in addition to that centre, can be seen five streets branching from it which will before long be completely illuminated by high-pressure gas-lamps—in units varying between 1800 candles and 3000 candles. It must be admitted that this is, and will be still more so, one of the best advertisements for gas that it has had for many a year in connection with public lighting. It is a fine opportunity for showing what can be done, and for dispelling the ignorance that abounds as to the capabilities of gas through the invention of recent times. And the Gaslight and Coke Company may be depended upon, not only by the inducement of penalty-saving, but for their own credit and that of the gas industry at large, to do all that is necessary to make this an educational demonstration, and to give the satisfaction that will extend their contract long beyond the five years that is its present duration. But congratulations should not stop at the Company who in open competition convinced the Westminster City Council that they could supply illumination at a price that speakers in the Council last Thursday acknowledged had astonished them when compared with that for electric lighting. To Mr. J. W. Bradley (the City Engineer), to the Works Committee and their Chairman, Mr. Jacques Abady, thanks are due for their insistence in treating the matter (now the exception rather than the rule where public lighting is concerned) purely from the business standpoint—allowing no favour, no under-current of outside or inside influence to operate, and caring not which system of lighting succeeded, in entering into a contract that offered them the requisite illumination at the lowest cost, from installation to maintenance throughout, and with such penalties attached (5s. per lamp per day for deficiency in illumination) that habitual non-compliance with contract might mean that, at the end of a year, the ratepayers would find themselves in pocket over the bargain.

That there is a vast amount of ignorance on this matter of the capabilities of gas used in modern manner and types of lamps is evinced by the petition that was signed by tradesmen in the area that is the subject of the contract, asking for a postponement of decision. Postponement! What for? Very naturally the Works Committee who had made so complete an investigation of the matter, and had been very careful to frame the conditions of contract so that there should be precise knowledge as to what was being tendered for and ultimately paid for, could see no advantage in postponing the matter; and the Council had such confidence in the Works Committee and the Chairman (who happens to know what he is talking about when the subject of illumination is being discussed) that a largely preponderating vote was given in favour of the report and against postponement. The Works Committee know more about the relative merits of gas and electricity for street lighting after their investigations than do the petitioning shopkeepers who have not investigated the matter. Men in the Westminster City Council, too, whose votes in the past have been in favour of electric lighting contracts—one of them much regretted now—are to-day in favour of the newer modes of gas lighting. Electric lighting is losing its novelty; and novelty and sentiment in this matter are fast going by the board. A year hence the shopkeepers of the locality will be wondering why a mere request for their signatures—a request with, possibly, an electrical origin—asking for postponement was complied with so readily and ignorantly. Even those members in the Council who spoke in favour of the granting of the request were sincere in their expressions of perfect satisfaction that no real good would come of it, in view of the progress of gas lighting, and the financial advantages of the gas project compared with the electrical. It is, as said, purely a business matter. The Works Committee and the Council had to look at it from the point of view of the interests of the ratepayers as a whole, and not from that of a section only as represented by the shopkeepers in the streets in question. They had indeed to protect these shopkeepers from themselves; for when the Council found that the illumination of certain streets would not be affected other than for the better by a change and at a lower cost, their duty was quite plain. There was no alternative; and therefore no necessity for delay. In the little historical sketch (p. 192) which shows the steps that have led to the present satisfactory success, in the succeeding report of the Works Committee, and in the speeches made in the Council chamber, there are many points which will be found of more than ordinary interest as bearing upon the superior position that gas occupies to-day in the contest for street lighting.

This contract is based upon illumination. That is what is going to be purchased, paid for, and had according to specification; and, if it is not had, then the penalties for deficiency will promptly come into force. This brings us to a question in street photometry. We have frequently mentioned the limitations of the use of the photometer in the streets. But there is an important distinction to be made in this connection, in considering candle power, if misleading conclusions are to be avoided. In looking at the report of the Works Committee of the Westminster City Council, the members appear to be conscious of this distinction, and to have avoided the misleading conclusions, because, while the report is based upon units of light of different candle power, it is apparent from it, and from the remarks made at the Council meeting, that it is recognized that the photometer as applied to the testing of one unit of light compared with another unit of light on exactly the same column will give relative results. It is, in fact, strictly accurate to say that, by taking a 53-candle power lamp from a 12-foot column, and replacing it by a 90-candle power lamp, one is increasing the light in exactly the proportion of 53 to 90 candles. Where a misleading use of street photometers is often made, is in comparing a light of one value on a column of a certain height with a light of another value on a standard of a different height. For instance, take an incandescent gas-lamp, or a metallic filament lamp, of 90-candle power on a 12-feet column, and compare it with an 1800-candle power arc lamp on a 20-feet column. The 1800-candle power is nominally equal to twenty lamps of 90-candle power. But no one, with any knowledge of these matters, would suggest that twenty 90-candle power lamps could be replaced by one 1800-candle power lamp, and the same illumination be given

in the street. The system of separate units upon separate columns, each kept up to the mark by constant tests upon the photometer (with the photometer and the testing angles stereotyped), is one to which, we think, no objection can be taken, because such tests simply standardize each unit under its own conditions of use, and make no attempt to express a 90-candle power lamp on a 12-feet column with an 1800-candle power lamp on a 20-feet column. But it does compare a 90-candle power gas-lamp with a 90-candle power electric-lamp the same height from the ground; and it would be belittling the intelligence of readers to say that the value of the one form of illumination compared with the other shows any difference, under normal conditions, as regards illuminating power. To this extent we have an absolutely fair photometrical measurement; and if on this basis electricity had beaten gas, we should have been the first to admit that it had beaten it fairly.

The duty of local authorities is to keep down expenditure for public lighting as for other things consistently with efficiency. The Westminster City Council have recognized this; and they are determined to have what they pay for. It may be incidentally mentioned, too, that Mr. Bradley has decided to have nothing less than 90-candle power lamps in the streets within the jurisdiction of the Council. If they persevere with the policy they have now adopted, it may be predicted that their district will be a pattern in public lighting efficiency and economy that will have a marked influence on public lighting generally, and on transactions between the buyers and sellers of illumination for street purposes.

The Judgment of the Lords.

The curtain has been rung-down on the first scene in the contest over the Standard Gas-Burner Bills; and in a manner that, after the unconditional, favourable decision of the Committee on preamble, and the ill-concealed signs of chagrin on the part of the opposition, was anticipated in our first editorial last week. The opposition appeared on Wednesday morning at the time appointed to consider clauses; but the appearance was only to ascertain definitely whether or not the Committee had absolutely disposed of the alternatives to rejection that had been placed before them. This the Committee made it clear they had done, and had in consequence declined to entertain them. Thereupon the opposition withdrew; and the act and statement of Mr. Ram, K.C., put the promoters in possession of the knowledge that the opposition threats of Monday in the corridor were not idle ones, and that there was merely to be a suspension of hostilities, until the Bill comes before a Committee of the Lower House. The success in the Upper House must not, however, be allowed to lessen or weaken effort in the Lower House; nor must there be any abandonment in any form or degree whatever, between now and then, on the part of any existing participant in the Bills. It must be a shoulder-to-shoulder fight in the House of Commons. Though, however, we counsel absolute firmness, there is no fear on our part that the Lower House will in any way depart from the precedent ensconced in the Gas Acts and Provisional Orders of the past five years, and adopted in the Model Clauses. But this, of course, does not imply certainty. There are Committees who are not always guided by precedent, and who create new ones. The hope of the opposition is that they may obtain a Committee who will lend a willing and friendly ear to the unjust and unnecessary claim for some *quid pro quo* as it is miscalled for placing the promoting companies in possession of a right accorded them by the long-sustained parliamentary principles applying to the testing of gas. They do not really look for the rejection of the Bills; but, if they can put some burden upon the companies which the latter will consent to bear, or which will force them to withdraw the Bills, their purpose will be served. It is a purpose upon which we cannot congratulate opponents or their supporters—supporters in part serving local authorities who may adopt the burner without having any actual restriction placed upon them. Manchester uses the "Metropolitan" No. 2 burner. What would the Manchester Corporation say (the Gas Committee and the Gas Engineer, we know, would be delighted) if, as the price of the application of that burner, Parliament decided that the profits of the Gas Department appropriated for the relief of the rates should be restricted to some small percentage. Profit limitation is right; it applies to statutory gas companies. But the Manchester, the Birmingham, and many other local authorities owning gas-works would look upon the restriction suggested as a dear price to pay for the use of the No. 2 burner.

Assuming that the opponents of these Standard Burner Bills did, unfortunately, achieve their purpose, and cause the withdrawal of the Bills, it would be a grievous set-back for the gas industry; and the effects of the unhappy piece of work would take much time to obliterate. The gas industry would not thank anyone who had had part or lot in putting an obstacle in the path to the goal of the cheapest possible gas service, and of the greatest possible freedom in meeting the competition that assails on all hands. But paltry though the case and objects of the opposition are, the Select Committee who are the appointed parliamentary judges have to be reckoned with. Verily, however, we should not have much regard for any Committee who accepted such a disjointed case as that which was put before Lord Ritchie's Committee. From beginning to end it displayed a remarkable inconclusiveness and incoherence (as Mr. Honoratus Lloyd's masterly exposition showed) that must have impressed the Committee almost as much as the case of diametrically opposite qualities that was presented on behalf of the promoters of the measure. A good test-burner is the "Metropolitan" No. 2 admitted certain of the opposition witnesses; while another one of the little group of obstructionists characterized it as an unscientific thing. Dire results for the gas consumers were predicted as following its adoption; the trail of those results is not discoverable in Manchester either in the large territory supplied or in the financial position of the gas undertaking, nor in any other town or district where the burner has been adopted. While the illuminating power of the gas has been reduced in Manchester and elsewhere with excellent result for the numerous purposes in which atmospheric flames are required, and for which and in gas-engines the bulk of distributed gas is now used, an opposition witness, for whom we have the greatest respect, but whose gas experience is more academical than practical, says that the high illuminating power of gas should be maintained. Another opposition witness talked of gas-engines that are being worked, under existing circumstances, up to their maximum having to be scrapped in consequence of the adoption of the "Metropolitan" No. 2 test-burner; while another says, any change the burner effects means not scrapping, but quite a slight adjustment. But it is the flat-flame consumer (who to-day represents a very modest percentage of the gas output), the consumer who declines to use his gas so that he obtains ten times more light from the gas which he consumes, for whom there is this great show of protest, and weeping claim for some *quid pro quo*. There is a want of reality and sincerity about it all. The opposition, however, having had the weaknesses and contrarieties of their case pointed out with such damaging effect in the House of Lords, will doubtless try to produce a little more homogeneity before presenting it to the House of Commons. The case as presented to the House of Lords stands, and so will be at the service of the promoters in the Lower House. In the interests of the Bills, we could not wish for anything better than that the opposition case before us should be again presented when the curtain rises the second time on the meeting of the opposing parties. On the other hand, the case of the promoters as submitted in the Lords is now fully before the opposition; and they will, there is no doubt, submit it to the most critical examination to ascertain whether some of the deficiencies of their own case can be patched up by little extractions from the promoters' evidence. However, the unqualified success in the House of Lords, and the frailties disclosed in the ranks of the opponents and in the quality of their evidence, gives confidence.

One thing is certain, that this persistent fighting over the "Metropolitan" No. 2 burner, and over the testing question generally, is having the excellent effect of showing Parliament that illuminating power is a moribund quality for gas, and therefore a solecism as the foundation of a standard. It was rather expected that in the House of Lords the opposition would have made much of the infliction of a calorific power standard and test. But they thought better of it; and there was nothing more than passing reference to it. The question of a supplementary test does not, in fact, arise in connection with this Bill, which is merely for changing one of the instruments used in carrying out the present prescribed test. And to discuss the question of the adoption of the calorific standard and test, as an alternative to the present illuminating power standard and test, would hardly suit the cards of the local authorities, for more reasons than one.

There is, too, the want of precedent; and against present request stands the past refusal of Parliament to impose, where it has been asked for, a second penal test upon gas companies. So the opponents were well advised in not pushing calorific power very far in this case; but, of course, they may alter their tactics in the second House. It may, however, be taken by them as positive that, sooner than be made to bear the burden of a second standard and test for quality—a standard which has no real affinity with the existing standard—the promoters would withdraw the Bills, though fully knowing that calorific power as the standard quality will come, but it must come as a substitute and not as a supplement. Had the Wandsworth and Brentford Companies not withdrawn from the Standard Burner Bills, which act removed the opposition of the London County Council, it is just possible that more might have been heard of the calorific power standard and test, as it was to placate the Council in connection with their last Bill that the Gaslight and Coke Company agreed to the insertion in the Bill of a standard and test, subject to triennial revision. In this relation, it is of interest to note that Mr. W. J. A. Butterfield, in his evidence for the promoters, expressed the view that the Company would at times have some difficulty in maintaining their calorific standard if they worked-down to their obligation in regard to illuminating power; and Mr. Corbet Woodall confirmed this when he said it has been found that, working even with an illuminating value of 15 candles, the Company are not always able to maintain the calorific value specified in their Act.

It is hardly likely that the Committee stage of the Bills will be taken in the Commons before the recess promised to the members by the Prime Minister. It is hoped that it will be possible for the House to adjourn some time next week; and to make the break extend over three weeks—thus covering the Whitsun holidays. But when the Committee stage of the Bills is reached, in the best interests of the gas industry, we look for (as will all who have those interests truly at heart) as complete success as a Committee of the House of Lords have considered the promoters' proposition merits.

Profits, Prices, and Parliament.

Last session Parliament inaugurated the policy of the restriction of appropriation for the general rates of gas profits by municipalities owning gas undertakings who were applying for further powers. The instances were Salford and Oldham. The Salford Corporation, in view of the defence by Parliament of the interests of the gas consumers, and of the curtailment of the liberty of the Corporation in respect of profit appropriations, withdrew their Bill; but from what has happened in the case of Glasgow during the past week, it seems probable that the action of the Salford Corporation has only deferred the time when they will inevitably have to accept restriction. The Glasgow Corporation are on a different footing from most other municipal bodies. They have not abused the freedom that they possessed in regard to profits; but, as a matter of fact, they have, in what should be, though unfortunately it is not, the true spirit of municipal trading enterprise, devoted their profits to the benefit of gas undertaking and consumers alike, with the result that the price of gas in the area is to-day low—for lighting 2s., and for power 1s. 8d. In the Consolidation Gas Bill that the Corporation have before Parliament, they asked for the liberty as to profit transference for rate relief within the city to be preserved to them; and they also sought for differential prices as between the city supply area and the supplementary supply area, and between consumer and consumer, according to purpose and extent of custom. But the House of Commons Committee have practically disallowed both proposals. In regard to price, there may, under their decision, be differentiation as between gas used for lighting and gas used for all other purposes. But that is all. Thus the effect is that throughout the area a flat-rate for lighting and another flat-rate for all other purposes is to obtain, if the Bill is not abandoned. We cannot admit the justice of this. It is opposed, so far as the outer districts are concerned, to a very common practice of Parliament; and it certainly places the gas undertaking in an unfair position in competition with both electricity and producer gas. Under the decision, too, there is also to be equality throughout the area in the matter of the charges for public lamps.

As to appropriation of profits, in view of the record of the Glasgow Corporation, we cannot help feeling some sympathy with them over the decision; but in furtherance of the principle for which we have ever contended in connection with municipal trading profits, we cannot confess to any particular sorrow that a Commons Committee have again supplied evidence that it is the intention of Parliament to prevent municipal trading undertakings, and the patrons of these undertakings, being made the victims of a form of indirect taxation for the greater benefit of those ratepayers who may not have contributed a penny towards the making of the appropriated profits. There is more reason for this strong attitude on the part of Parliament nowadays, in view of (in the case of gas undertakings) competition, of the large proportion of gas consumed by the poorest class of inhabitants, and of the growing tendencies in respect of the constitution of municipal bodies and of the principles—unsound, unjust, and uneconomic—of certain of the constituent members. But what we cannot really understand is why in one session a House of Lords Committee and a House of Commons Committee should have defined a limit to which appropriation could go; while in the very next session (in this Glasgow case) there should be a complete annihilation of all right to appropriation. Is it because of the fact that Glasgow has refrained (save once) from taking advantage of their powers in this respect in the past, that they are to be debarred by explicit rule in the future? However, in the cases of Salford and Oldham and now Glasgow, it has been the out-district authorities who have effectually waged war in Parliament against profit appropriation in aid of the rates of the district governed by the gas-works owning authority; and there is much to be said from their point of view. But if the out-districts are to have equality in the matter of prices with the inner area, then there is not (though we are strongly opposed to the practice) so much objection to a limited appropriation of profits in aid of the rates. We should, however, much prefer to see, as being altogether fairer, a small difference in the outside charges, and no profit appropriation in aid of the rates.

The decision, regarded in the whole, in this Glasgow case appears to be altogether too severe; and there is no doubt that it, and the Salford and Oldham cases, will have some retarding influence on municipal authorities in their applications to Parliament in respect of the revision and amplification of the powers affecting their gas undertakings, which, generally speaking, have suffered largely from the depredatory policy for supplementing the revenues of local exchequers. But although the Glasgow Corporation have been (if the Bill proceeds) deprived of their power of profit appropriation, they are to be allowed to take from revenue, to a defined amount, for depreciation. Otherwise revenue and expenditure are to approximately balance; surpluses being carried forward until, as soon as practicable, they can be applied to a reduction of the charges throughout all the limits of supply. There is some talk in Glasgow of the Bill being withdrawn, in view of the sweeping effect of the decision of the Commons Committee—practically levelling financial interests in the gas undertaking throughout the area of supply. As to the wisdom of withdrawal, opinions are divided. What the Corporation have to consider is: Are they likely to get any more acceptable terms by postponing the realization of further parliamentary authorization? In the matter of profit appropriation, they have to accept the situation that what has been done in their case, or (if there is withdrawal of the measure) what may be done in the future, is the result of the unbridled indulgence of other authorities. That they have not themselves assisted to bring about this condition should be to them an emollient in bearing the result of the iniquities of local governing bodies in not a few, but many, other places.

Nuisance from Coalite Plant.

Hythe is unhappy; and the cause of the unhappiness is that the gas-works is unfortunate enough to possess a coalite plant. We hinted as much in last week's issue. The plant is a nuisance to the town, through the emission of smoke and steam, and a smell (we refrain from any attempt to describe it) that is incompatible with the amenities of a holiday and health resort. The nuisance, it appears, has been going on for some time. Householders have sent a signed objection to the Council, complaining bitterly of the noisome fumes; lodging-house keepers have had sad visions of their business being injured in the coming season. Representatives of the Council have had an interview with the

Directors of the Company, the Town Clerk has written remonstrating letters, and there have been veiled threats of an application for an injunction. And this is all through the coalite plant. The Company have made promises to mitigate the nuisance; but the nuisance, according to statements at the last meeting of the Council, continues. The Company protest that everything possible is being done to produce a mitigation of the cause of complaint; but the fact that the complaints do not cease shows that the mitigating steps are insufficient, and that the trouble must be fairly serious, and not so easily conquerable as the Company would like it to be. A persistent nuisance of the sort is not a recommendation for the plant. But mitigation only will not satisfy the good people of Hythe; they want nothing short of absolute abatement. And what is more they mean to have it.

It is obvious that the Council do not intend to tolerate the nuisance any longer, nor to be satisfied with mere promises. The Company are to give an undertaking now not to manufacture coalite until the end of September, so as to preserve the reputation of the town unblemished in the eyes of its patrons; and they are to spend the time during which the plant is at rest in an effort to make effectual provision for putting an end to the nuisance. The alternative is litigation; and the Town Clerk declares possession of an abundance of evidence for the purpose. However that may be, there ought to be no trouble in letting-down the plant for six months, as, it would seem, business is not very flourishing in coalite in the locality; and there is sufficient in stock to meet the needs, until the end of September, of householders enthusiastic for this particular fuel. Judging from the nature of the complaints, it is patent that the nuisance is produced by the quenching of the coalite. What a pity the Company ever gave up that cumbrous mode of quenching in closed chambers—a mode to which original coalite thought and skill attributed so much of the marvellous virtues of coalite! The only course now open to the Company appears to be the provision for quenching of an enclosed structure, and a long shaft for carrying away the fumes well above the surrounding houses. But in view of the exposed situation of the gas-works, it is open to question whether this, in all states of the wind, would be wholly effective. We are afraid the Hythe experiences will not do anything towards helping the British Coalite Company to secure accommodation for their plant in other gas-works. The sum-total of their connections with gas-works at present is Plymouth and Hythe, although in December last, in the Company's report, we were told that further contracts were being negotiated with other gas undertakings, which, it was hoped, would be brought to a conclusion at an early date. Apparently they have been—and unsuccessfully. Another "nuisance" of a different character is that coalite tar, in the opinion of the Borough Surveyor, is not so suitable for road-surfacing purposes as ordinary gas-works tar.

Sulphate of Ammonia and Beet Cultivation.

In the course of a letter addressed to us by the Earl of Denbigh in regard to the article entitled as above in our issue of April 5, he remarks: "The question has become much more alive than it ever was before; and I do not think there is any likelihood of it relapsing into obscurity. Interest is being awakened all over the country. . . . A strong agitation is required to educate the people." His Lordship is doing his part in trying to obtain the encouragement from the Government that is required for the establishment here of the beet-sugar manufacturing industry. "The whole question," he asserts, "hangs on the matter of excise duty, and whether, as an infant industry, protection can be assured to home sugar manufacture for, at all events, a reasonable number of years." His Lordship has, in the House of Lords, endeavoured to obtain from the Government some expression of view on this point. But the utmost that he could extract from Lord Denman, representing the Government, was that they would give the matters raised their earnest consideration. That is all right so far as it goes; but it does not go far. It is to be hoped that the "earnest consideration" may be construed to also mean prompt consideration. Most other countries are growers of beet, and have their sugar manufactories; and this country is their customer to the extent of importations representing 20 millions sterling. Of those who have taken part in the renewed controversy on the subject, Sir Walter Gilbey is the only one who is pessimistic; and the bogey that frightens him is a failure of some 30 or 40 years ago. But there have been many experiments since then, showing that the soil and climate of this country are as good as, and even better than, those of other countries for beet growing; and it only needs the favourable aid of Parliament to let this country participate in an industry in which other countries share, and with immense profit. Earl Denbigh has received revised figures from different countries as to their growth of beet per acre. The average is not higher than 12 tons; while in our Eastern counties, particularly Lincolnshire, the trials made place the productivity of the soil at about 16 tons per acre. Of course, it would be somewhat lower than this in less-favoured parts of the country; but Earl Denbigh sees no reason whatever why the farmer on good land should not clear a net profit of from £6 to £7 per acre. But unless the Government holds out a helping hand, the capital required for what should prove a large and lucrative industry will not be forthcoming. The obstacle at the moment is a fiscal, and not a practical, one.

The Gas Industry and Co-Partnership.

"The increase in the number of gas companies practising co-partnership principles is a striking one." This is a sentence from the report which was submitted at the annual meeting of the Labour Co-Partnership Association last week—some reference to the proceedings at which will be found in another portion of to-day's issue. The statement is a well-deserved recognition of the spread of the movement in the gas industry. In fact, at the meeting, one could not fail to be struck with the large extent to which "gas" figured in the proceedings. In the first place, there was the report, to which reference has already been made. This stated that concerns representing over one-half of the capital employed in the gas industry, apart from municipal undertakings, are now working on the co-partnership principle. Another good feature to which the Committee were able to draw attention was the obviously growing confidence of the employees in the opportunity these schemes offer for the investment of their savings. We agree with their expression of opinion, that "it is evident that co-partnership has at last 'caught-on' in the gas industry." But while doing so, we would venture to remark that there is still plenty of room for fresh adherents to the good cause, if only about one-half of the capital in the hands of gas companies is so far under the banner of co-partnership. How much has already been done was set forth in an interesting manner by Mr. L. W. Simpson Rostron, in the course of a paper which dealt with the subject of co-partnership generally, and its application to the gas supply business in particular. In moving a resolution expressing the meeting's deep sense of the value of the principle of co-partnership as a means of promoting industrial peace, progress, and efficiency, Mr. Corbet Woodall (the President-Elect of the Association) stated his main reasons for being a convinced co-partner and concluded by remarking that "in this faith he hoped to continue, even though progress were less rapid in the future than present indications encouraged them to hope." May present indications be even more than amply fulfilled!

Against the Eight-Hour Day.

The eight-hour day emerged for a brief space last week from the underground surroundings amid which it has of late been mostly heard, and appeared in the Manchester City Council, where its pretensions were subjected to a strong light of destructive criticism. The question was that of the establishment of an eight-hour day for all workmen employed by the Corporation; and the discussion took place upon a resolution to give effect to the decision of the Workmen Special Committee, arrived at after careful consideration, and the study of information obtained from various corporations and Government and other workshops, "that it was not desirable to establish an eight-hour day for the men employed by the Corporation." The Council were, of course, not unanimous in their adoption of the Committee's view; but after a long discussion, the recommendation that they should not resolve themselves into champions of the cause of the eight-hour day was agreed to. There is, obviously, a wide distinction between an eight-hour day willingly conceded by employers, and one forced on an industry by Act of Parliament. But, nevertheless, even in the case of a Corporation like Manchester, with various trading concerns, the conditions in the respective departments vary so much that a hard-and-fast rule for all would no doubt be

difficult of application. Apart from this, the men are not, apparently, all desirous of such a change; for it was pointed out by one member that an objection they have to an eight-hour day is that it obliges them to work so hard. There is good reason in this, if there was sound basis for the contention that the Corporation would have as much work done in eight hours as is at present performed in nine or more hours—or else, as one speaker remarked, "there must be considerable malingering at present." Many people will agree with the argument that the Corporation, as a trading concern, cannot do more than the firms outside; and that what they were asked to sanction was municipal philanthropy. The true inwardness of the proposal was indicated by one of its supporters—evidently of a socialistic turn of mind—who remarked that somebody must lead the way in this matter; and Manchester should do this, and not "follow on." "He supported the eight-hour day because he was hostile to this miserable conception of civic responsibility; and, again, because it was some step towards reducing the immense amount of poverty that surrounded every industrial area."

Obituary.

The death is announced, at the age of 89, of Mr. J. M. H. CARDELL, who was one of the first Directors of the Bodmin Gas and Water Companies. He was appointed Chairman of the Water Company in 1878, and continued to hold that office till his death. Several years ago his co-Directors presented him with a testimonial, in recognition of his services. Mr. Cardell was also a Director of the Fowey Gas Company. He was associated with the municipal government of Bodmin, and in 1880 was Mayor of the town.

A painful sensation was caused at Dawlish on the morning of Monday last week by the news of the sudden death, during the previous night, of Mr. HENRY HARTWELL, the Secretary of the Gas Company, and a member of the Urban District Council. He had been in failing health for some time, but was about as usual the day before his death. On his way home he was seized with a fit of coughing, which resulted in the breaking of a blood vessel; and he expired shortly afterwards. He was highly respected by all who knew him.

We regret to record the death last Thursday, at his residence, The Manor House, Bishop's Down, Tunbridge Wells, in his 77th year, of Mr. FREDERICK TENDRON, Deputy-Chairman of the Continental Union Gas Company, and formerly Chairman of the Grand Junction Water-Works Company. Mr. Tendron was also Chairman of the Assam Company and of the St. John del Rey Mining Company. His connection with the latter Company lasted for thirty-three years, during eighteen of which he was Chairman. The Board, in notifying his death to the shareholders, observe that the present satisfactory position of the Company is largely due to his zeal and ability.

The death occurred last Tuesday of Sir ROBERT GIFFEN, K.C.B., the well-known statistician and economist. Deceased was born in 1837, and in early life was closely associated with journalism. In 1876, however, he was appointed Chief of the Statistical Department of the Board of Trade, and held the office for six years, when he was promoted to one of the assistant-secretaryships. He subsequently became Controller-General of the Commercial, Labour, and Statistical Departments of the Board. He was created a K.C.B. in 1895, and retired from the public service two years later. He was a Fellow of the Royal Society, and was President of the Statistical Society from 1882 to 1884. Sir Robert was the Official Auditor of the accounts of the Metropolitan Gas Companies.

Personal.

Mr. FRED E. PYE, son of Mr. T. Ebenezer Pye, Engineer and Manager of the Chichester Gas Company, has been appointed Manager of the Petersfield Gas-Works.

At a meeting of Directors of the Stone Gas Company held on Friday, Mr. T. W. SAVILLE, of the Thornliebank Gas-Works, Glasgow, was appointed Manager and Secretary, in succession to Mr. JOHN HOLMES, the present Manager, who is retiring on a pension after 31 years' faithful service.

Gas Companies' Exhibit at the Japan-British Exhibition.

In the "JOURNAL" for Feb. 22 (p. 487), attention was called to the action of the London and Suburban Gas Companies in arranging to hold a great demonstration of the applications of gas at the forthcoming Japan-British Exhibition, at Shepherd's Bush. The names of the members of the Committee (of which Mr. D. Milne Watson is Chairman) who are organizing the display were then given; and it was also mentioned that Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company, is acting as Hon. Secretary and Treasurer. The Committee have made a practical move in giving effect to their plans by having definitely secured space in the Decorative Arts Section on the principal gangway leading through it. This should be an excellent position. The actual building work has been commenced; and good progress has been made with the structure.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 199.)

BUSINESS last week in the old-fashioned markets of the Stock Exchange was fairly good on the whole, though at times a bit chequered, and in the later portion of the week overborne by the great pressure of the settlement. The young lions of speculation were as rampant as ever, with undiminished roaring in the Rubber den. Oil ventures (which are much more interesting to the gas industry) were highly excited before the close. The opening day was rather quiet, and generally inclined to dulness; but there was nothing to speak of in the way of a fall. Gilt-edged were flattish, and Consols gave way a small fraction, while Rails had a halt. On Tuesday, the more sedate departments were still quiet, but the tone improved. Government issues were steady; and Rails were stronger. Some improvement in Americans was distinguishable. On Wednesday, there was some anxiety as to how the heavy settlement was going to turn out, but apprehension abated. The tendency in some lines was good. Rails were strong, and showing further advances. Thursday was better all round. Consols rose, and other gilt-edged lines rose with them. Rails continued to pursue an upward course. Americans were firmer; and the Foreign Market had strong points. Rubber and Oil activity was immense. Friday's business was interfered with by the settlement; but the tone was quite cheerful, though there was some realizing. Rails were cheered by coal prospects. Saturday was much occupied with settlement matters, but the general tendency was firm. In the Money Market, rates moved downward until checked by a sharp demand. Discount was easier, but steadied before the close. Business in the Gas Market was a good average, and was more largely distributed than usual among all classes in the list. There was not much change in prices; but wherever quotations did vary, they improved. In Gaslight and Coke issues, the ordinary was active and steadily hardened, with prices rising from 103⅝ on Monday to 104½ on Friday and Saturday—a rise of ⅛. The secured issues were quiet; the maximum realizing 88¾, the preference 104½, the debenture from 82 to 82½. South Metropolitan was active and firm at figures ranging from 120¾ to 122. Commercial 4 per cent. made 106, and the 3½ per cent. 103. Among the Suburban and Provincial group, Alliance and Dublin was done at 85 (a rise of 1), Brentford old at 251, ditto debenture at 102, British at 44 and 44⅜, Bournemouth preference at 15, Bromley "A" at 117½, ditto "B" at 88½, South Suburban at 121 and 122½, ditto debenture at 122½, and Tottenham "B" at 113½ and 114—a rise of 1. On the local Exchange, Liverpool "B" marked 164½. In the Continental companies, Imperial was very quiet but steady at 181½ and 182½, Union was done at 99½, and European part-paid at 18½. Among the undertakings of the remoter world, Bombay changed hands at 6 9/16, Cape Town mortgage at 50 and 50¼ (a rise of ½), Melbourne 5 per cent. at 100¼ and 101, Monte Video at 12⅞, Primitiva at 7 11/16, ditto preference at 5 9/16, and San Paulo at 15⅜ and 15½—a rise of ¼.

ELECTRICITY SUPPLY MEMORANDA.

Maidstone and the Fixed Price per Lamp—Power of Charge and the Restrictions of Use—A Newmarket "Authority" on Combustion Products—Public Building Lighting—New Lamps.

THERE must be the deepest possible sympathy with those municipal electricity concerns who regard their position as so rickety that they feel there is nothing more to be done than to have recourse to that speculative system of business—a fixed price per lamp. The fixed price is the only thing that is "fixed" about it. The very foundation of the idea is loose and unsubstantial; the consumption per lamp is neither definite nor measured; and where the system is applied, there (unless a meter is put in for other purposes) the scope of business with the consumer is perforce limited. The Maidstone Corporation are giving the consumers the option of a fixed price per lamp in place of a flat-rate; but the Maidstone Corporation do not understand very much about the system, nor do the Electricity Committee, nor does the Chairman of the Committee (Alderman Vaughan). When the recommendation came before the Council the other day regarding the fixed price, a simple question was put to Alderman Vaughan; and his reply was that he would ask Mr. Hoadley, who was responsible for the arrangements, to explain. Now Mr. Hoadley is the Electrical Engineer; so that Maidstone is committed here to a sort of one-man scheme. The Chairman and members of the Electricity Committee do not know whether what they are adopting is a project worthy of their acceptation; and the other members of the Corporation know less. And this municipal administration of a trading undertaking! The Corporation and the Electricity Committee obviously believe in the simple life in the matter of local government; and suffice it for them that they can shift responsibility on to the shoulders of their paid officials. The Maidstone scheme is this: That in the case of old customers for business premises, a charge is to be made of 10s. per annum for each 32-watt lamp alight at one time, or a flat-rate of 4d. per unit; and in the case of new customers, 10s. per annum for each 32-watt lamp alight at one time, or a flat-rate of 8d. per unit. For private houses, the proposal is to charge 8s. per 32-watt lamp per annum alight at one time, or, if preferred by customers, 4d. per unit.

In the first place, it would be interesting to know whether the Corporation have the power to discriminate between old and new consumers, charging the one at the flat-rate 4d. and the other 8d. per unit. Why should next-door neighbours be dealt with in this way? The idea of differentiating between them is absurd; and the proposal is entirely opposed to the spirit of modern legislation, which recognizes the principle that (as provided in the model clauses in relation to section 13 of the Gas-Works Clauses Act, 1847) contracts should be "alike in terms and amount under like circumstances to all consumers." We are afraid, too, that the provisions of section 31 of the Electric Lighting Clauses Act, 1899, are often infringed in connection with electrical idiosyncrasies in respect of charges. But anyway the fixed price per lamp is a dear way of purchasing electricity. In his celebrated work on "Electricity for Everybody," Mr. R. Borlaise Matthews quotes 7·7 units as the average annual consumption of an 8-candle carbon filament lamp; so that the same average would apply to a 25-candle power (or 32-watt) metallic lamp. If Mr. Matthews is correct, then the consumer who is paying 10s. or 8s. for such a lamp will be paying dearly per unit for his electricity; whereas "the prices to be charged by the undertakers for energy supplied by them shall not exceed those stated in that behalf in the Special Order, or, in the case of a method of charge approved by the Board of Trade, such price as the Board of Trade determine on approving the method." However, we are of opinion that the system, aided by restriction, will soon kill itself. As to restriction, it was pointed out by one Maidstone councillor that an ordinary tradesman would scarcely know how many lamps would be alight in his various departments at one time; and therefore he was curious as to what means the Committee would adopt in order to ascertain this.

The same councillor was also anxious as to the position of a tradesman who had a number of lamps which he did not use regularly. The tradesman has to fix upon his maximum requirement; and he will suffer if he exceeds it. Mr. Hoadley explained the deeply-laid scheme in this way: Supposing a person has 140 lamps installed on his premises; if he only uses 25 at one time, he will only have to pay for 25. If, however, he ventures to put the twenty-sixth lamp on, the whole of the lamps will show their resentment by flickering, and will refuse to give a proper light. Therefore for daring to put on the extra lamp beyond his maximum, the consumer has to suffer depreciation of the whole of the lighting in his premises. This is strange business. What, too, will the tradesman do if he wants extra lighting at Christmas time? There are not many tradesmen who will like to be manacled in this preposterous way; and we can see a reversion to meters (the installation of which the department hope to save) as soon as there has been a little experience of Mr. Hoadley's plan, which has been obediently swallowed by the Corporation and the Electricity Committee, without troubling to fully understand it. However, the Maidstone experience will probably be that of other towns—a seven days' wonder; and then it will find its ultimate resting-place in oblivion, with Mr. Hoadley remembering it as one of the mistakes of his (as it is that of most electrical engineers) strenuous professional life.

The controversy between the champions of gas and electricity at Newmarket continues—a matter upon which we commented on March 29. Mr. Troughton has had a tilt at some of the misstatements made at the annual meeting of the Electric Supply Company; and Mr. Frank S. Simpson, the Electrical Engineer, who has gained a certain amount of local notoriety by the discovery of a *rara avis* who—through satisfaction with a less amount of illumination in his house, or fewer hours of consumption, or a previous prodigal use of gas by possibly old-fashioned methods—has actually had electricity accounts lower than the former gas accounts, has had a turn at Mr. Troughton. Mr. Simpson has the knack to perfection of the electrical man of airily disposing of scientific facts, which are as real as anything can be. He seems to assume that the rooms of a house are all air-tight compartments. We have not found them so. If they were, then those who complain now of the stagnation of the atmosphere in electric lighted rooms when closed on winter nights, and the contamination of the atmosphere by the excretions of human respiration, would have more cause of complaint than they have now. It is still quite a common thing to find gas used in theatres that are electrically lighted, for causing an updraft in a central roof-ventilator. Of course, the electrican will say that is superfluous. But we put a very practical question to Mr. Simpson, who writes only with the support of the old and crusted partizan statements that one has seen in print so frequently. He makes a point of the consumption of oxygen by gas-flames. Now if there were not a continual exchange of air going on in a gas-lighted room, the air would be depleted of the essential to the sustenance of the gas-lights, the lights themselves would fall off in illuminating power, and the rooms would be absolutely uninhabitable by human beings. But here we are at the present moment writing in a room, without any special means of ventilation, where the incandescent lights are as brilliant as they were when lighted a couple of hours previously. Will Mr. Simpson explain this (if he is correct) phenomenon? We cannot accept Mr. Simpson as an authority on the products of the combustion of gas. Where gas is burning, the natural tendency is for the heated air to rise; the occupants of a room do not live near the ceiling, but in the lower portion of the room where the circulation of the fresh incoming air is the greatest.

It would be well if electricians, instead of relying solely on the historical utterances of electrical partizans, would look at this matter in a practical way. Here is Mr. Simpson speaking of the "sulphurous acid and sulphuric acid" produced by the combustion of the sulphur contained in coal gas; and of fearful injury to everything with which they come in contact. He speaks of the products of combustion as being extremely detrimental to health. He speaks of partially consumed gas escaping, when inverted burners are used, that is "highly charged" with carbon monoxide —"a very poisonous gas." Now to test Mr. Simpson's knowledge, again in a practical way, we ask him to assume the use in a room of a 50-candle power inverted burner, consuming 2½ cubic feet of the local gas an hour, and tell us the volumes of "sulphurous acid and sulphuric acid" that are given off per hour. Also, taking the same burner, will he tell us how much "partially consumed gas" escapes into the room, and how much of this partially consumed gas is represented by carbon monoxide? He ought to have no difficulty in giving us this information, seeing that he says there are "considerable quantities" of this partially consumed gas escaping, and that the gas is "highly charged" with carbon monoxide. He will, we know, forgive these inquiries, as it is so difficult to argue on mere electrical platitudes and postulatory assertion. And as the mixing of "the products of combustion with the air we breathe is exceedingly detrimental to health," perhaps he will produce a few of the good people at Newmarket who have been afflicted in health by being gas consumers. They deserve our sympathy. Practically the whole of our lives have been spent in rooms lighted by gas during the hours of darkness, and for a great number of years heated when necessary by gas-fires. Here we are; but, electrically, and according to the learned Mr. Simpson, we ought not to be. One other statement that this self-constituted authority makes is that a "single gas-burner vitiates more air than four men." He does not say the size of the burner; if he is referring to an ordinary one, and not to one belching forth flames from a low-grade gas under a steam-boiler, we say that he is stating what is false. If he will be a little more explicit in his statement, and give somewhat more information on the point of the vitiation, we will reciprocate by telling him why his declaration is false. Now, Mr. Simpson, we shall look for an answer to our inquiries.

The interlinking of public bodies through multiple representation on the part of individuals, continues to produce an undue amount of favour for electricity where the supply is municipally controlled, in the lighting of public buildings. Gas has been used in divers old-fashioned ways in many of those buildings for decade upon decade, and rarely in them do we see gas lighting applied in its modern modes. During the succeeding decades, there has been no particular complaint as to bad lighting and vitiated atmosphere; but now that a light of 100-candle power can be obtained by the consumption of 5 cubic feet of gas as compared with nearly 50 cubic feet of gas with flat-flame burners, the light is worse than ever, so is the vitiation of the atmosphere, and the health of those who are compelled to occupy public buildings so illuminated is absolutely shattered, though the appearance of witnesses does not subscribe corroboration. That, however, is the sort of nonsense that is now put forward for the digestion of the Inspectors of the Local Government Board when holding inquiries into proposed loans for converting the system of lighting to electricity at the expense of the ratepayers, and in the sole interests of the municipal electricity concern. An example of this has been produced by an inquiry at Dublin into an application by the South Dublin Board of Guardians for sanction to a loan of £3000 for converting the lighting of the workhouse. Whether Mr. P. C. Cowan, the Inspector, will swallow all that was told him, or will be satisfied that all possible has been done, in a cheaper way, with modern gas lighting, remains to be seen. One of the possible horrors of electricity, it is noticed, did not come out in the evidence. There was illustration of it at the Battersea Anti-Vivisection Hospital last Wednesday evening. An electric wire fused in one of the upper corridors connecting the wards with the operating theatre and bath-rooms. The twenty-four in-patients were much alarmed; but fortunately mastery of the fire was quickly accomplished, through the prompt action of the staff and the fire brigade.

Of the making of metallic filament lamps in different ways, and under different titles, there appears to be no end; but the lighting efficiency does not improve. The advent has just been heralded of tungsten lamps with drawn-wire filaments; and the crimpled and crookedly hung filaments are not by any means things of beauty. But perhaps they will be used for concealed lighting, or with obscured globes; so that the somewhat higgledy-piggledy appearance of the filaments will, under such circumstances, not matter much. The lamp is being made by Messrs. Siemens Bros.; and it is called the "Onewatt," which is a misnomer. It is made for 100 to 130 volt and 200 to 250 volt circuits; and the selling price is placed at 4s. 6d. The efficiency is stated to be 1·1 watt per Hefner unit; so that each 100 Hefner unit lamp will require 110 watts per hour, and produce a light (if the makers' figures are correct) of 90 British candles. Therefore the efficiency—1·22 watts per candle—is much about the same as that of the older type of metallic filament lamps. The advantages of the lamps are stated to be that a longer length of filament is brought into a spherical bulb of less length than the metallic predecessors, and that the vertical candle power is appreciably increased. Drawn-wire filament lamps are also being introduced by the British Thomson Houston Company; but about them not much is yet known.

NOTES FROM WESTMINSTER.

THE past week was one of far-reaching importance for the gas industry—in the first place, because the House of Lords Committee to whom the Standard Burner Bills were referred have sent them forward precisely as they came before them; but, as will be seen below, this does not end the fatuous hostility to the measures. In the second place, the principle initiated last session in parliamentary enactment, that the gas profits of municipal gas concerns shall be employed solely or largely in the interests of the undertaking and consumers who make them, has found further expression in the Glasgow Bill. Other interesting features are noticed below. The South Hants Water Bill also obtained one day's hearing by the Committee who are to adjudicate upon it. In regard to future possible happenings, Mr. Wardle, member for Stockport, has tabled a notice to the effect that an instruction be given to the Committee who will consider the Bishop's Stortford Gas and Electricity Bill to insert a clause limiting the interest on capital, and directing that the profits in excess of such interest be applied in reduction of the prices of both gas and electricity. The Brighton and Hove Corporations have definitely decided to oppose the local Gas Company's Bill when it reaches the House of Lords, as they are dissatisfied with the 1d. taken from the standard price in the Commons, being of opinion that the lowering should be greater.

Standard Burner Bills. In view of the fact that last week we noticed the decision delivered by Lord Ritchie's Committee in regard to the Standard Burner Bills—a decision wholly in favour of the promoters—and in view also of the fact that further comment appears in an earlier column of this issue, it is unnecessary to do more than make a few remarks here in order to maintain the continuity of the story. On the Monday morning, there was an address by Mr. Talbot, on behalf of the Mersey Docks and Harbour Board, who were anxious that the Liverpool Gas Company should be ruled out of No. 1 Bill. Then Mr. Ram followed, and in lieu of rejection or curtailment of the standard price, he asked that the reduction of illuminating power produced by the "Metropolitan" No. 2 burner should be compensated by the raising of the illuminating power standard, and that the Bill (if it arrived at the status of an Act) should not take effect until such time as there had been inquiry in each case to ascertain whether the provisions applying to each individual company were duly regarded, and full weight given to them in the interests of the consumers. The absurdity and the worthlessness of this proposal were as apparent to the Committee as to the technical gas men assembled in the Committee room. As a matter of fact, it was in direct antagonism to the statutory principle which recognizes that gas suppliers have a right to the burner best adapted for developing the illuminating property of the gas they supply. The reply on the whole case by Mr. Honoratus Lloyd, on behalf of the promoters, was generally conceded among those who heard it (save by the opposition) to be a dialectical, logical, and analytical triumph. He did not spare his opponents in any one respect. He dragged the weaknesses and inconsistencies of their case into the full light with the remorselessness of one who felt that such a mass of incongruity deserved all the exposure that it was in his power to give it. He was listened to with almost breathless interest. Even the opposition Counsel and the witnesses whose evidence he was treating so mercilessly hung on his words, and attended intently to the story of the sorry mess that had been made of the opposition case by its construction of inharmonious parts. We publish a fairly full report of the speech in our "Parliamentary Intelligence;" and as it will be read, and that with more than passing interest, we will not trouble to even indicate its points here. Such an examination, however, is helpful to any Committee. It is easy for men versed in parliamentary warfare, and themselves possessing a fair share of intelligence, to discriminate between forensic superficiality and speciousness and sound criticism and the piecing together of parts in proper relation. The Committee's judgment delivered in favour of the Bill without any qualification, was a complete ratification of the estimate made by Mr. Lloyd of the character of the opposition case. On Wednesday, though Mr. Ram appeared to make doubly sure that the Committee had fully considered the clauses he had suggested for insertion in the measures, his stay was brief; but he announced what was obvious from his withdrawal, that the parties would meet again in the Lower House. There were applications on behalf of the Radcliffe and East Stonehouse District Councils for testing-places in their respective districts; but they were rejected by the Committee in common with all the other pleadings and requests of the opponents. The Standard Burner Bills Nos. 1, 2, and 3, therefore go to the Commons in the form in which they were brought before Lord Ritchie's Committee.

Glasgow Profits and Prices. For length of discussion, the Glasgow Gas Consolidation and Further Powers Bill has the record for this session. It monopolized the consideration of Mr. Mooney's Committee during the whole of their sittings the week before last, and up to Thursday morning last. As explained in the "Notes" last week, the conflict between the authorities in the outer area of supply and the Glasgow Corporation was mainly on the questions of the transfer of gas profits in relief of the city rates and of the making of differential charges as between the city supply and supplementary supply district, and as between consumer and consumer. The outer districts contended, *inter alia*, that the proposals of the Corporation would be detrimental to the development of their areas; and their arguments (as did those of the out-districts in the cases of Oldham and Salford last session) prevailed, though Glasgow, it must be confessed, has in the past behaved rationally and even handsomely to the consumers throughout their area of supply, in respect both of prices and of keeping hands off the gas profits for the benefit of city ratepayers. The central interest of the long discussion is in the decision of the Committee itself. The only differentiation in the matter of charges that they thought fit to allow was as between lighting purposes and all other purposes—heating, cooking, and power; so that there is to be throughout the area of supply (inner and outer districts alike) a flat-rate for lighting, and a flat-rate for other purposes. This is a serious pronouncement not only for Glasgow, but, if the Bill proceeds, for other municipal gas undertakings as a precedent. Comment on the point appears earlier in this issue; so that, without further remark, it may be passed by here. As to the appropriation of profits in aid of the rates of the city, the Committee were totally averse to it. The attitude of Glasgow in this matter in the past was referred to last week. They have (with the exception of one year) applied, as is right and proper, profits entirely to the production of the best gas service at the lowest possible price; but the outer districts scented danger of a change of policy in this regard, and successfully opposed the perpetuation of the practically unexercised power. Mr. Balfour Browne tried hard to get the right for Glasgow to appropriate 1d. per 1000 cubic feet (which would have equalled the 1 per cent. proposed by the House of Lords for Salford last year); but all his pleading was ineffectual to move the Committee from their decision, that any surpluses should be devoted to the common reduction of the price of gas throughout the area served by the gas undertaking. The verdict in this respect is one that is in agreement with the policy consistently advocated through long years in these columns; but, taking the decisions as to price and as to profits together, the outer districts are placed in a preferential position in view of the extra costs entailed in their supply. On the other hand, the Corporation are to be allowed to continue the appropriations for depreciation on the lines they have been following hitherto —viz., 1½ per cent. on works, 3 per cent. on chemical works, 2 per cent. on pipes, 6 per cent. on meters, and 10 per cent. on stoves. The Committee, too, declined to permit any special provision for working capital or reserve; and they decided that public lighting charges should be uniform throughout the district of supply. There was a proposal on the part of the Corporation to purchase the Baillieston Gas Company, and to include the area in the supplementary supply district. But the decision of the Committee brought the area into the city supply district, which has the effects of wiping out one of the conditions of purchase, and of exposing the Company to the competition of the Corporation. Glasgow promptly expressed a willingness to exclude the area altogether; but the Committee would not entertain this. It is a curious position. The outer districts are flushed with their success in obtaining such complete equality with the city in their gas supply; but whether their joy will be long sustained, cannot at the moment be said, as it is an open question whether the Corporation will not abandon the Bill, in view of the drastic decision, and the tight-lacing to which it commits them—much against their will—in the conduct of the gas business.

Irish Gas Bills. It is a rare thing for an Irish Gas Bill to go through unopposed. The local authorities of Ireland have a peculiar propensity for fighting, and for finding fault with those who carry on businesses that are largely dependent on the good will of the local governing bodies. It cannot be expected that concerns of the size, and having the limited trading opportunities of the majority of the gas undertakings of Ireland, can do so well for the communities they serve as gas undertakings carried on under more propitious circumstances. The local authorities expect too much; and their requirements lead to friction. The Wicklow Gas Bill is an exception to an all too common rule in the matter of hostility. It is unopposed—up to the present stage; and it has passed the Unopposed Bills Committee of the Commons, with, under an agreement with the Council, the fresh money powers brought down from £6000 to £4000. But the Tipperary Gas Bill has not been so fortunate. The fight over it before Mr. Armitage's Committee has been a tough one, with the result that such onerous terms were put upon the Company as the price of securing a much-mangled Bill, that they have been compelled to withdraw it. The increased facilities that were asked for would undoubtedly have enabled the Company to do better for the consumers; but, to all intents and purposes, the essential ones were altered in a manner that rendered them either practically abortive or entirely crippling. There is an old-standing grievance about the site of the works, owing to their nearness to dwelling-houses. So strong is the objection that in 1903, for this, among other reasons, the Board of Trade refused a Provisional Order for which the Company had applied. But it comes to this, that the dimensions of the business and its potentiality are such that both the Company's and the consumers' interests would, on account of the cost, be absolutely wrecked by removal. Mr. R. B. Anderson, Mr. E. H. Stevenson, Mr. Frank Jones, and others supported the proposals of the promoters; while Mr. William Newbigging and certain local residents gave evidence in opposition. Mr. Pelham, of the Board of Trade, was also called for the purpose of informing the Committee as to the reasons that induced the Board to reject the application for an Order seven years ago. The decision of the Committee put the

Company in a singular position. They reduced the maximum price to 4s. 3d., considered the existing capital sufficient for the Company's needs, were of opinion that the capacity of the works ought not to be enlarged on the present site, reduced the dividend on the ordinary capital to 7 per cent., placed the dividend on the preference capital at 5 per cent., and cut out the proposed sanction to an application for electricity supply powers. A more crippling decision on an enterprise of this character, it would be hard to imagine; and so the measure has been withdrawn. Now that the Bill has gone, it is a question whether it would not have been to the interests of the consumers to have allowed the Bill to proceed on acceptable terms to the Company rather than for the latter to continue under the present unregulated conditions. The Council, though they gained what they sought, asked for costs; but the Committee would not go to that length, which would have been tantamount to saying that the Company had done wrong in making the attempt to place themselves under parliamentary control on reasonable conditions.

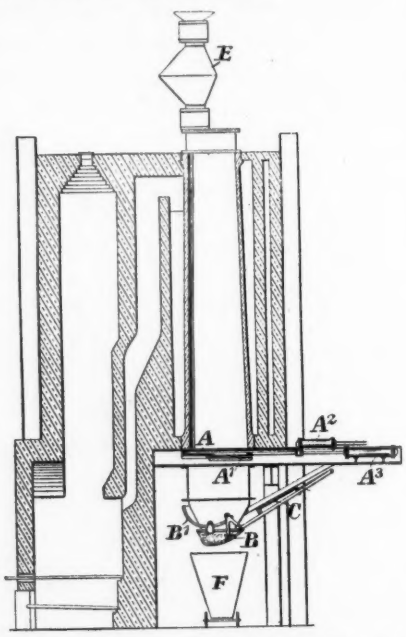
Cambridge Water. Consequent upon a report by the Local Government Board as to the quality of the water supplied by the Cambridge Water Company's wells at Cherryhinton and Fulbourn, the Company are asking the sanction of Parliament to the construction of certain new works and a reservoir at the former place, to be fed by a projected well some 1½ miles to the east of Fulbourn, at a spot where there is a sparse population. Powers were also sought to sterilize water, to make bye-laws, to raise £180,000 of additional capital and £60,000 by borrowing, and to increase the charges for water. The Bill has been before a Committee of the Lords, with Earl Kintore as Chairman. The Corporation of Cambridge objected to the sterilization of the water on the ground of potentiality of pollution, and asked for the abandonment of the existing sources of supply. They also gave the Committee to understand that they are contemplating the promotion of a Purchase Bill, but the matter is suspended for further consideration between the present and the Commons stages of the measure. The County Council were opposed to both the existing and proposed works; and generally from other quarters there was objection to the projected new pumping-station, on the grounds of injury to existing wells. In short, nothing that the Company are doing, or proposed to do, was right. But the purity of the Cambridge water was attested by several witnesses; and, on this and other points, the Company were supported by eminent authorities. On the second day's hearing, the Committee announced that they would only be prepared to pass the Bill on the conditions that there was prompt sinking of the proposed new well, and that the future supply was drawn wholly from this well. The decision delivered at their third sitting is interesting. The Committee were of opinion that the Company should be granted the capital powers asked for; that the contingency fund should stand, being kept at a reasonable amount; that five years should be the maximum period for the construction of the whole of the works, with the exception of the extension of adits; that twenty years should be the maximum period of borrowing for the extension of mains and the like; that the new scale of rates should be levied upon the rateable value; that the first water-closet should be in all houses free; and that the higher scale of charges should not be imposed until after the borrowing of the moneys required for works construction. The sterilization clause was not approved.

Report of the National Physical Laboratory.—We have received from the Director of the National Physical Laboratory (Dr. R. T. Glazebrook, F.R.S.) the report for the past year, which was submitted at the general meeting on the 18th ult., on the occasion of the annual reception. The work done and in progress at the Laboratory, in the departments of scientific research in which our readers are most interested, was dealt with in the account of the reception which appeared in the "JOURNAL" at the time; and it does not call for further notice. The report of the Director on the Physics Department is followed by reports made to him by the Superintendents of the Engineering, Metallurgy, and other Departments. Accompanying the report is Vol. VI. of the "Collected Researches," in which is a reprint from the "Proceedings" of the Physical Society of London of the paper by Mr. C. C. Paterson, a Principal Assistant in the Physics Department, on "The Proposed International Unit of Candle Power," which was given in the "JOURNAL" for Aug. 10 last (p. 383).

Algæ as a Result of Air-Lift Pumping.—That compressed air caused algæ growths in the water supply of Frankfort (Ind.), is the opinion expressed by Mr. J. B. Martin, in a paper read recently before the Indiana Sanitary and Water Supply Association, and noticed briefly in "Engineering Record." The supply for this city, Mr. Martin stated, is drawn from a 30-feet stratum of water-bearing sand and gravel lying between strata of impervious blue clay. In 1892, an air lift was used to aid the flow, for the ground-water level had been receding gradually for some time. At no time prior to the use of compressed air was the taste or odour of the water objectionable; but after its use growths of algæ were constant a source of trouble that the air-lift method was finally abandoned in 1907. While the air was used, the water was discharged into two covered brick storage reservoirs, waterproofed on the inside and cleaned regularly; so that, in Mr. Martin's opinion, the algæ could not be attributed to exposure of the water to sunlight. After the air-lift method had been superseded by pumps in the wells, no further trouble was caused.

WILSON'S VERTICAL RETORT.

On March 18 last year, Mr. Alex. Wilson, the Engineer of the Glasgow Corporation Gas Department, applied for a patent (No. 6449) for "Improvements in the Working of Vertical Coal-Gas Retorts;" and his specification, accepted on the 18th ult., was issued last week by the Patent Office.



It is accompanied by a sectional elevation of the retort (here reproduced). At the bottom of the vertical retort, and connected to it, is a coke-measuring chamber for withdrawing a measured quantity of coke from the retort at regular intervals—say, every three or four hours. To allow of the measuring chamber being filled with coke from the retort, and for the purpose of cutting off the supply from the retort, there are provided at the bottom two sliding doors A A^1, which recede and advance towards the vertical centre of the retort as shown. The doors work in guides, and are operated by power cylinders A^2 A^3—the piston-rod of the upper cylinder being preferably connected to the slide A by means of a pair of side links (not shown) which are connected to a crosshead of the rod. The rod of the lower cylinder may be connected to the door A^1 as shown.

The measuring chamber is provided with a water-seal cup B to close its mouth while being filled, and also to prevent the escape of gas from the retort during this operation. The cup may be suspended from the race B^1, secured to the coke chamber by means of brackets with race rollers on wheels; and for actuating the cup, a rod or pair of rods may be pivoted thereto, and connected to the piston of the power cylinder C.

The method of working is as follows: The slides or doors A A^1 are opened so as to allow the coke from the retort to fill the chamber below; the doors being then closed. The closing cup B at the bottom of the coke-chamber is opened to allow the measured quantity of coke to be discharged, and then closed, and the retort-doors opened. This allows another quantity of coke to fall into the coke-chamber; and the remainder of the material having fallen, the space left above is filled up by a fresh quantity of coal dropped into the top of the retort from the coal-chamber E—these processes being repeated at suitable intervals.

An alternate form of working would consist in employing a measuring vessel, such as F, below the retort, but not connected with it; the measuring chamber being filled from a hopper or chamber at the bottom of the retort. In this case, the doors A A^1 and corresponding parts are not required; the charge being withdrawn from the chamber below the retort by opening the cup B provided at the bottom of the chamber. As soon as the coke-measuring vessel F is filled, the cup B is closed; and the remainder of the charge in the retort having fallen, a fresh quantity of coal is dropped into the top of the retort from the coal-chamber E as in the first arrangement.

Presentation to Mr. W. S. Morland.—A few days ago, the employees of the Gloucester Gas Company at the works at Hempsted, presented a handsome marble timepiece to Mr. W. S. Morland, the Company's Engineer and Manager, as a mark of their esteem and goodwill, on the occasion of his approaching marriage. Mr. F. Yates, who made the presentation, spoke in felicitous terms of the good feeling which had always existed between the workmen and Mr. Morland; and in asking his acceptance of the timepiece and an address, with the names of the subscribers, he expressed the good wishes of all the employees for Mr. Morland's future happiness. Mr. Morland suitably replied.

DESSAU SETTINGS OF EIGHTEEN VERTICAL RETORTS.

By Dr. R. Geipert, of Berlin.

The following is an abstract translation of a lecture delivered by Dr. R. Geipert, one of the Engineers at the Berlin works of the Imperial Continental Gas Association, at the annual meeting at Magdeburg, on Friday last, of the Association of Gas Engineers of Saxony and Thuringia.

The most important part of the operations of a gas-works is undoubtedly that carried on in the retort-house; and it has the greatest influence on the economical efficiency of the working. The first problem in the carbonization of coal is how to obtain the greatest possible quantity of gas from the coal with the smallest expenditure on fuel and labour. Once the crude gas has been obtained, its handling and purification present no difficulties. The apparatus required therefor is simple and easily supervised. The same is true in regard to the physical and the chemical processes involved in the purification of gas. On the other hand, the formation of the gas is most intimately bound up with the conditions in which it takes place, which conditions determine its economy. The relations between the production and purification of the crude gas are also clearly expressed in the expenditure which is incurred in the different sections of the operations of the gas-works. For example, at Mariendorf about £300 is annually spent on new purifying material, but nearly a hundred times this sum—viz., £25,000—goes for the coke used as retort-house fuel. These facts emphasize the great importance of the manager of a gas-works devoting very special care to the retort-settings—on the one hand, by making judicious selection of the system of setting employed, and on the other hand, by working in the most rational manner. [The author here refers to a paper by himself, on the regulation of the primary and secondary air in retort-furnaces, of which an abstract translation is given on p. 169 of to-day's "Journal."]

At the outset, the choice of the system of retort-setting presents difficulties. Our forefathers were better off in this respect. There were only horizontal retorts which were heated by direct or producer furnaces. Considerable advantage was achieved when the waste heat of the chimney gases was utilized according to the principles laid down by Siemens for heating the air used for combustion. To-day, however, choice has to be made from a large number of types of settings. This fact should be welcomed as an indication that the art of gas manufacture has not been left behind in the advance which is to be observed in the whole field of industry, and which is the result of the endeavours to attain efficiency and economy. These causes have produced the modern systems of retort-settings, the object of which is to secure the gasification of the coal in the most efficient manner with the smallest expenditure on fuel, labour, and plant. The endeavour has been made to attain this purpose by changing the position and size of the chambers in which carbonization takes place. In this way, the transition ensued from horizontal to inclined and vertical retorts, the chief result of which has been economy of labour. The carbonizing chambers are called (according to their size) either retorts or chambers. They are distinguished fundamentally by the ratio subsisting between the heating surface and the quantity of coal carbonized; and the question of the influence of this relation on the factors which determine the economy of gasification becomes of most particular importance. The knowledge gained on this point from experiences with horizontal and inclined retort-settings is inadequate; and what little there is is not free from objection, because the size of the free space above the layer of coal in the retort influences the composition of the gas and its bye-products. The decomposition of the products resulting from gasification takes place in the free space; so that it cannot be settled what has been formed in the first instance from the coal, and what must be ascribed to subsequent decomposition. Vertical retorts afford the opportunity for better observation, as a free space is entirely done away with in them. The most modern setting of this kind—namely, the setting of eighteen vertical retorts—is distinguished by the retorts being specially narrow, so that the heating surface is relatively very large. [See "Journal," Vol. CIX., p. 96.] The effect of this condition on the evolution and quality of the gas, and on the duty of the setting in respect of gas making, consumption of fuel, and the cost of installation, is the subject of the investigations about to be reported.

Only a few years ago, such considerations scarcely passed beyond theoretical speculations, as investigations and experiences were wanting as a practical basis for them. Subsequently, however, a series of factors have been experimentally established which admit of trustworthy conclusions being drawn. It will be sufficient to direct attention to the figures which an impartial person—namely, Professor Bunte—has obtained with settings of twelve and eighteen vertical retorts. [See "Journal," Vol. CIV., p. 256, and Vol. CIX., p. 27.] Further, the author may be allowed to give by way of comparison the values which were obtained in vertical retort settings at Zürich with Saar coal [see "Journal," Vol. CIV., p. 256] and those obtained by him in his trials of the setting of eighteen retorts. The latter figures will be given in detail in the course of this lecture. The author's investigations were made with Saar coal from the two mines, Sulzbach and Maybach. The first coal, which contained 10·7 per cent. of ash, appears not up to average quality; and the author, therefore, restricts his comparisons to the Maybach coal which, with 8·4 per cent. of ash, may be regarded as of normal quality. The following are the more important comparative data.

Table I.

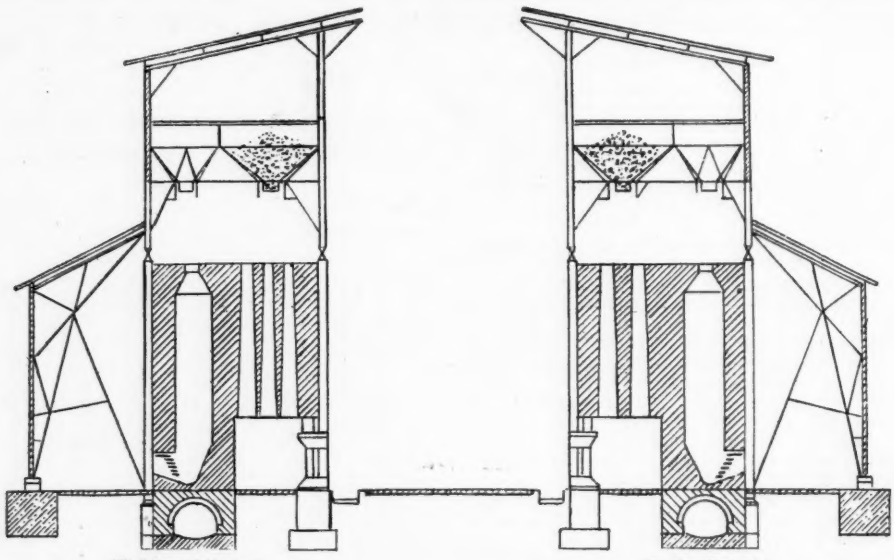
Description of coal	Silesian.		Saar.	
Authority	Professor Bunte.		Dr. Geipert.	
Number of vertical retorts in setting	12	18	10	18
Coal carbonized per setting per 24 hours . . . cwt.	274·5	391·2	(223·8)	(369·7)
Gas made per setting per 24 hours . . cub. ft.*	189,465	262,213	(154,573)	(255,327)
Gas made per ton of coal . . . . cub. ft.*	13,806	13,405	13,815	13,814
Gross calorific power of gas, B.Th.U. per cubic foot*	537	543	560	564
Coke used in retort furnaces—				
Per cent. by weight of coal carbonized	14·1	11·8	15·0	11·8
Pounds per 1000 cubic feet of gas made	22·8	19·8	24·3	19·2

* At 60° Fahr. and 30 inches barometer.

Thus with Silesian coal, less gas was obtained in the setting of eighteen retorts than in the setting of twelve retorts from a given weight of coal; but it had a higher calorific power. This point becomes of industrial importance to a gas-works, since the higher the calorific power of the gas, the greater is the quantity of cheap water gas which may be added; and it is in this direction that economy becomes possible. Having regard to this fact, the gasification in the two investigations may be regarded as almost equal from the economical standpoint. With Saar coal, the gas evolved from a given weight of coal is the same in both types of vertical retort-setting; but the gas from the setting of eighteen retorts has a higher calorific power. These experiences lead to the conclusion that the relative increase of the heating surface obtained in the setting of eighteen retorts has a favourable influence on the procedure of gasification.

A reduction of the fuel consumption for a given quantity of coal carbonized would be expected *à priori*, as the relative increase in the heating surface is favourable to the transmission of heat from the furnace gases to the charge in the retort. With a setting of eighteen retorts, an advantage is also secured through the radiating surfaces of the setting being smaller relatively to its coal-receiving capacity than those of a setting of twelve retorts which has the same dimensions. Both causes co-operate in producing the result established in the trials that were carried out by the Carlsruhe Instructional and Experimental Gas-Works—that the consumption of coke in the retort-furnaces is reduced to only 11·8 per cent. by weight of the coal carbonized or to 19·2 lbs. per 1000 cubic feet of gas made. It is important to regard both these figures together, in order to obtain a clear view of the heat consumed in gasification. In the Munich carbonizing chambers Professor Bunte obtained 11,518 cubic feet of gas at 60° Fahr., and 30 inches, having a gross calorific power of 615 B.Th.U. per cubic foot, per ton of Saar coal. The consumption of coke in heating the chambers amounted to 15·3 per cent. of the weight of coal carbonized or to 29·7 lbs. of coke per 1000 cubic feet of gas made. This figure may be compared with that for the setting of eighteen vertical retorts after correction has been made for the difference in the quality of the gas. If the calorific power of the Munich chamber gas is reduced to that of the gas made from Maybach coal in the settings of eighteen retorts—564 B.Th.U. per cubic foot, by admixture with water gas, the volume of mixed gas of 564 B.Th.U. so obtained per ton of coal would be 13,743 cubic feet. On increasing the consumption of coke from 15·3 to 17·6 per cent. to correspond to the production of the water gas added, it may be calculated that the coke consumed per 1000 cubic feet of gas made amounts to 28·7 lbs. per 1000 cubic feet. Since the working costs have to be booked not on the quantity of coal carbonized but on the volume of gas made, it will be seen that the amount of fuel in the setting of eighteen vertical retorts is only 19·2 lbs. per 1000 cubic feet as compared with 28·7 lbs. for the Munich carbonizing chambers, or only about two-thirds what it is with the latter.

It has been contended with reference to the high make of gas per ton of coal in vertical retorts when steam is admitted, that it is only necessary to increase the temperature of large carbonizing chambers in order to obtain a large make of gas from the coal in them also. This view cannot practically be sustained. It is put forward as a special advantage of the large chambers that the time required for working-off the charge is 24 hours, which admits of the chambers being charged only in the day-time. An increased temperature, however, would shorten the time required for working-off the charge; and if, notwithstanding the higher temperature, the charge were left in the chambers for 24 hours, the consumption of fuel for heating them would increase to so considerable an extent that the process would really become



Eighteen Retorts. Twelve Retorts.

unremunerative. In the author's opinion, it is a disadvantage of the chambers that they are restricted to a fixed time for working-off the charge. With the retorts, on the other hand, the time of working-off and the oven temperature can both be varied at any time to suit the coal being carbonized; while the adaptability of vertical retorts in regard to conditions of working is rendered practically unlimited by the production of water gas in them.

The greater capacity of the setting of eighteen vertical retorts and the better transmission of heat result in the duty of the setting being higher. With the setting of twelve retorts, 189,465 cubic feet of gas were produced in 24 hours; but in the setting of eighteen retorts 262,213 cubic feet of gas were produced in the same time, which is an increase in the productive capacity of 38 per cent. This greater production has a double effect economically, as both the relative cost of the installation and the wages are diminished. An installation of seven settings of twelve vertical retorts produced daily 1,326,255 cubic feet, which is the same quantity as five settings of eighteen vertical retorts would produce. Since both settings occupy the same space, the installation of settings of eighteen retorts need be only five-sevenths the size of that of the equivalent installation of settings of twelve retorts, and its cost would be reduced in approximately the same proportion. Similarly, the expenses of running the plant are diminished. The work in the retort-house is likewise considerably diminished, especially owing to the fact that the bottom doors of each row from back to front of three vertical retorts in the setting of eighteen are mounted on one shaft. Three retorts are thus discharged and charged again with 1½ tons of coal in the same time as an ordinary vertical retort with a charge of three-fifths of a ton of coal. At Mariendorf fourteen settings of twelve vertical retorts are worked by two eight-hour shifts each comprising three men. [This does not include the work of clinkering and cleaning, which requires three men per 24 hours.] Thus one man is required for 2·3 settings (or taking into account the clinkering, &c., one man per 1·55 settings per 24 hours). One man can do at least as much with the settings of eighteen retorts, as they are very conveniently adapted for working, owing to the opening and closing of the lids of the retorts being effected by hydraulic power. Thus the make of gas per man with them would amount to 2·3 × 262,213 = 603,090 cubic feet (or, allowing for clinkering, &c., 406,430 cubic feet per 24 hours). This figure is not even approximately attained by any other system of setting. With horizontal chamber settings 56,500 cubic feet of gas are made per man.* Consequently, 32 men are required in place of 3 (or 4·5) men with the settings of eighteen vertical retorts.

By way of supplementing the results of the trials carried out by

* This figure is taken from a paper by Herr Peischer, the Manager of the Innsbruck Gas-Works, where horizontal chambers are exclusively used. The paper will be given in the "JOURNAL" next week.

TABLE II.—*Carbonizing Trials of Different Descriptions of Coal in a Setting of Eighteen Vertical Retorts.*

Coal carbonized	80 p. ct. Unscreened English (Boldon) 20 p. ct. Silesian (Dubensko) Nuts.		Unscreened Westphalian (Consolidation).		Large Saar (Sulzbach).		Large Saar (Maybach).	
Composition of the air-dried coal—								
Moisture . . . p. ct.	2·7		1·5		1·6		1·3	
Ash . . . ,,	8·6		8·9		10·7		8·4	
Fixed carbon . . . ,,	57·9		60·8		57·2		58·2	
Volatile matter . . . ,,	30·8		28·8		30·5		32·1	
Yield of coke by crucible test . . . ,,	66·5		69·7		67·9		66·6	
Moisture in the coal as carbonized . . . ,,	4·1		2·2		1·5		1·2	
Total time taken to work off the charge . . . hours	12		11½		10½		10½	
Time during which steam was admitted . . . ,,	2		1½		1½		1½	
Average temperature of bottom heating passages of setting . deg. C.	1330		1365		1347		1318	
Duration of trial . . . days	6		5		4		3	
	Wet Coal.	Air-Dried Coal.	Wet Coal.	Air-Dried Coal.	Wet Coal.	Air-Dried Coal.	Wet Coal.	Air-Dried Coal.
Coal carbonized per 24 hours . . . cwt.	335·8	322·0	348·8	341·1	381·5	375·8	374·2	369·7
,, ,, ,, retort-charge . . . ,,	9·3	9·0	9·3	9·1	9·3	9·1	9·1	9·0
Make of gas per 24 hours, cubic feet at 60° Fahr. and 30 in. . .	226,757	..	244,732	..	253,914	..	255,327	..
,, ,, ton of coal ,, ,, ,, ,, ,, . .	13,492	14,067	14,031	14,354	13,313	13,528	13,636	13,815
Tar obtained, per cent. by weight of coal carbonized	5·17	5·39	4·5	4·6	4·85	4·92	..	..
Ammonia produced ,, ,, ,, ,, ,, ...	0·340	0·355	0·330	0·337	0·244	0·247	..	..
Gross calorific power of the gas, B.Th.U. per cubic foot at 60° Fahr. and 30 in. . . .	544		546		559		564	

TABLE III.

System.	Place of Working.	Gas Made per Ton.	Illuminating Power by "Metropolitan" No. 2 Burner.	Calorific Power, B.Th.U. Gross.	Calorific Valuation Figure, B.Th.U. in the Gas per Ton of Coal Carbonized.
		Cubic Feet.	Candles.		
Woodall-Duckham continuous vertical retorts	Nine Elms, London	12,833	15·18	570·0	7,314,810
Glover-West ,, ,, ,, ...	St. Helens	13,102	15·56	565·4	7,407,870
,, ,, ,, ,, ...	,, ,,	12,435	16·19	574·2	7,140,180
,, ,, ,, ,, ...	,, ,,	12,145	15·22	567·6	6,893,500
Dessau, intermittent ,, ,, ...	Sunderland	**12,465**	**16·84**	**615·12**	**7,667,470**
Glover, ,, chamber settings	Norwich	13,247	14·94	543·29	7,196,960

the Carlsruhe Instructional and Experimental Gas-Works already reported, the author has tested other descriptions of coal in the setting of eighteen vertical retorts, and obtained results which are recorded in detail in Table II. The make of gas shown in this table—both per setting and per ton of coal carbonized—must be regarded as highly satisfactory, as is also the quality of the gas as indicated by its calorific power. The yield of tar is normal, and that of ammonia is in all cases about 50 per cent. higher than with other systems of setting, even with Saar coal which, it is well known, produces very little ammonia.

There is very little to be said on the construction of the setting of eighteen retorts. It is exactly on the same lines as the setting of twelve vertical retorts, and has the same dimensions as the latter; but three retorts are placed in a row instead of only two as in the setting of twelve retorts, as may be seen from the illustrations accompanying Mr. Körting's paper and on p. 168.

Before concluding his observations, however, the author would briefly refer to two remarks on vertical retorts in general which were made at a meeting of English gas engineers. The reference is to Mr. Alfred T. Harris's paper read before the Midland Association of Gas Managers on March 3. [See "JOURNAL" for March 8, 1910, p. 659.] The remarks do not relate to the results of experience, but are conjectures which the author would like to correct. Mr. Harris is of opinion that the gas in vertical retorts is under a higher pressure than in retorts set otherwise than vertical, and that consequently the deposition of scurf is favoured in the former. Theoretically, however, this assumption is not tenable, and practically is without support. A somewhat higher pressure than the normal exists only in the first hours of carbonization. At this period the inner wall of the retort is, however, greatly cooled by direct contact with the wet cold coal, and is least adapted at that time for decomposing the gas. The pressure in the retort soon diminishes, and falls to that which is shown by the dip or seal. Apart, however, from this fact, the pressures in question are relatively small, and at the most are only some hundredth part of an atmosphere, and are therefore not such as to affect the primary or secondary phenomena of gasification. Further also the gasification results obtained in England with vertical retorts (and quoted by Mr. Harris) expressly contradict his contention. The vertical retort gas is shown to have a higher calorific value and a higher illuminating power than gas from other retorts. If there were practically extensive formation of scurf in vertical retorts through the decomposition of the hydrocarbons, the gas made in these retorts would be much inferior. On tabulating the figures given by Mr. Harris in the cases in which he states the calorific value of the gas, and calculating therefrom the calorific valuation figure for the yield of gas per ton of coal (*i.e.*, the product of the make and the calorific power of the gas), comparative figures are obtained which are shown in Table III. Mr. Harris states in most cases the net calorific power of the gas, which is not usual in Germany. Consequently the author has worked on the gross calorific power—assumed to be 10 per cent. higher than the net calorific power given by Mr. Harris. These figures show that the coal is utilized to the best purpose in Dessau vertical retorts, which yield 7,667,470 B.Th.U. in the form of gas per ton of coal carbonized. The other systems are at least 4 per cent. behind this quantity.

Mr. Harris further contends that the vertical retorts are not adapted for frequent putting in and out of use. Practice, however, has proved the contrary—namely, that vertical retorts with judicious handling have a greater life than horizontal and inclined retorts. With the latter, a working life of 1000 days is regarded as quite satisfactory; but even this durability is found illusory, since it is not ordinarily taken into account that the retorts have been repaired many times, and finally consist only of patched pieces. The author's experiences with vertical retorts are far more favourable. At the Oberspree (Berlin) works, the vertical retort-settings have been at work since January, 1907, and some of them have had 1200 days under fire uninterruptedly without any patching. And their condition leads to the hope that they will stand 1500 days under fire. Some of the other vertical retort settings were frequently put out of use—one setting as many as sixty times—because the output of gas from the Oberspree works varies greatly and the holder accommodation is small. These settings are perfectly sound and are in need of no repair. Equally favourable experiences have been obtained at the Mariendorf works, where the first bench of vertical retort-settings has been in use for two-and-a-half years and so has been under fire for 900 days; and still no term can yet be fixed for their becoming unfit for further work.

The author would also observe that step-grates in place of simple grates have been adopted in the producers with advantage. The work at the producers has thereby been considerably relieved, as clinkering with temporary grate-bars is no longer necessary. An arrangement has also been hit upon which reduces to a minimum the accumulation of thick tar in the hydraulic main. The gas leaving the latter is cooled immediately over it, and the tar which condenses (as well as the liquor) flows back through the hydraulic main. The asphalt-like constituents are thus dissolved; and the hydraulic main only needs clearing at rare intervals—say once in three weeks.

The author hopes that his observations will lead to the conviction that the setting of eighteen vertical retorts is not a haphazard production. It came into being on the strength of the experience gained by failures in trials made with vertical chambers; and it has fulfilled all the requirements which were laid down as essential prior to its construction. The bed of eighteen vertical retorts ought, therefore, to be acclaimed as marking a great step forward in the development of settings for the production of gas.

SIGNIFICANCE OF PRIMARY AND SECONDARY AIR SUPPLIES IN GAS-FIRED RETORT-SETTINGS.

The following is an abstract translation of an article by Dr. R. Geipert, one of the Engineers at the works of the Imperial Continental Gas Association in Berlin, published in a recent issue of the "Journal für Gasbeleuchtung."

Views on this subject are frequently expressed in conversation and in technical literature which do not accord with practical observations, and contribute to obscure a simple subject. The primary and secondary air supplies are introduced into a furnace through the draught of the chimney; and the heating is effected through a quantity of fuel gas, corresponding to the amount of primary air, being formed in the producer, which gas is burnt by means of the secondary air in the furnace chamber round the retorts. The theory of the process has been discussed by Dr. H. Bunte in 1878, and by him and others subsequently; and it has been shown that it is extremely important, for the sake of economy of fuel, that neither the fuel gas nor the secondary air should be in appreciable excess. Excess of fuel gas is specially disadvantageous. For instance, the author calculates that if the chimney gases contain 18 per cent. of carbonic acid and 3 per cent. of carbonic oxide, there will be a loss of heat equivalent to 14·3 per cent. of the fuel consumed. On the other hand, if the chimney gases contain 18 per cent. of carbonic acid and an excess of oxygen or air, the loss of heat is equivalent to only 4 per cent. of the fuel consumed. The technical problem is commonly to supply a constant quantity of heat in a furnace, or to increase or diminish the quantity of heat supplied according to the temperature required in the furnace. It is generally recommended, quite wrongly, that this object should be attained by keeping the position of the primary air damper unaltered, and controlling the heat supplied by regulation of the secondary air and the draught. As a fact, a constant supply of heat in unit time is attained by leaving the secondary air inlet and the draught unaltered. The draught and the composition of the fuel gas and the chimney gas remaining the same, the secondary air always passes through the furnace in the same conditions. It meets with the same resistance constantly, and its quantity depends solely on the size of the secondary air inlet. The primary air on the other hand meets with constantly varying conditions. The position of the primary air damper does not settle the quantity. The flow of primary air through the producer is affected by clinker and the size of the coke used as fuel, so that the greater the resistance the smaller is the quantity of primary air, and consequently of fuel gas produced, if the position of the damper remains unchanged.

Having regard to these facts, it may be stated that if the secondary air inlet and the draught are unaltered, the quantity of primary air will remain constant, provided that with uniform composition of the fuel gas the sum of the resistance in the producer and at the primary air inlet remains the same. This requirement can easily be satisfied in working by opening the primary air damper, as the amount of clinker on the grate increases to such an extent that the chimney gases have the theoretically correct composition. The ratio of secondary air to primary air will then remain as desired. It may appear difficult to carry this out; but in actual working it is very simple. It is well known that the blue flame of carbonic oxide, which is the most important constituent of producer gas, is observable even when traces of it only are present. If there is a little carbonic oxide in the flue gases, the admission of a little air through a sight-hole into the passages of the regenerator will result in the characteristic blue flame of this gas being produced. The primary air damper is then closed so far as is necessary to get rid of the blue colour of the flame. This will ensure the flue gases containing from 18 to 20 per cent. of carbonic acid. The simple working rule for obtaining the constant amount of heat, and uniform temperature of the setting in normal working, is, therefore, to keep the secondary air inlet unaltered and to set the primary air supply at frequent intervals, so as to obtain the proper composition of the flue gases. The draught, determined in the lowest passage of the regenerator shortly before the chimney-valve, should be kept constant.

If, on the other hand, the primary air inlet is kept constant, the heat introduced into the furnace must become smaller as the clinker in the producer increases in amount. The secondary air supply would then have to be checked in order to avoid a large excess of air in the flue gases. The draught would thereupon have to be increased to maintain the normal temperature of the setting. With the constantly varying resistance of the producer, a resetting of the dampers would be constantly required. It becomes practically impossible in this way to maintain a constant supply of heat to the setting. If, however, the secondary air and the draught are kept constant, a proper setting of the primary air supply in given conditions guarantees the required quantity of heat and uniform temperature in the setting. If the temperature in the setting, as determined by observations with Seger cones or a pyrometer, is found to vary through changes in the carbonizing conditions or other causes, it may be conveniently set right by altering the draught to correspond.

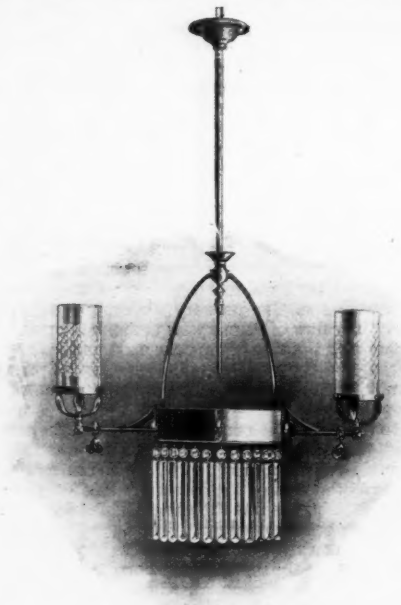
A USEFUL TRADE SHOW-ROOM.

Gas-Lighting Appliances for all Purposes.

THOSE engaged in commerce in these highly competitive days find it increasingly necessary to shape their methods on novel lines, and to do all possible to meet the convenience of those who constitute the buyers of their particular commodities. Mr. Julius Norden, at the large show-room of his firm, at 45, Farringdon Street, E.C., is just now engaged carrying out a scheme which he terms a "permanent exhibition" of gas-lighting appliances. His arrangements are well under way; and, when completed, gas and illuminating engineers will be able to inspect, in actual working order, within the one large show-room, high-pressure and ordinary pressure gas lighting, acetylene and air-gas lighting, portable incandescent lamps using methylated spirit and petrol, and special and new designs of fittings for use with any one of the systems. Town gas, of course, will take precedence in the display; but, as Mr. Norden rightly says, there are in the country numerous places, and important houses, factories, and mills, to which the town-gas mains have not penetrated, and to which it would not pay to carry them. But the gas and illuminating engineer has to make provision for them. The self-generating gas-plants enable this to be done, though not so conveniently as by town gas, in a fairly economical way. This is Mr. Norden's reason for extending his firm's business to all branches of gas lighting, and for arranging for working installations of various systems in the one show-room, so that clients and prospective customers may have every opportunity of judging of their capabilities and efficiencies, in comfortable surroundings.

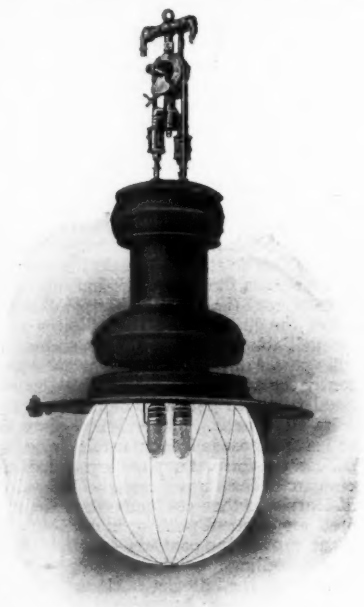
For high-pressure gas lighting, Mr. Norden has adopted in his display the Pharos light. This light is well known to readers;* and it will be remembered that (though since improved in details) it rendered an excellent account of itself at the Earl's Court Exhibition. It will be recollected also that one method of working the system is by providing for the supply of air to the lamps at high pressure; the gas supply remaining at ordinary district pressure. The air is conveyed to the lamps in the show-room by pipes painted red, and the gas by pipes painted stone colour. Some of the lamps are arranged so that, when the compressor is not at work, they can be run simply on the ordinary low-pressure gas; others are fixed so that (with a pilot light running from the ordinary gas supply) the lamps are lighted and extinguished by the mere starting and stopping of the air-compressor. The statement indicates the large scope and conveniences of the system. Some people do not like the gas itself under high-pressure, entertaining a notion that, should there be any leakage, the danger is greater with high-pressure than with low-pressure gas. The Pharos light, with the air only under pressure—quite apart from the question of efficiency—meets the views of such people. The simple arrangement, too, whereby, through the high-pressure air supply, is effected the opening and closing of the main gas supply to lamps, at any distance and to any number of lamps, also has its attractions and conveniences, among which are the saving of labour and facility of immediately lighting and extinguishing at will to meet any requirement or emergency. The lamps are likewise made for lighting and extinguishing in the ordinary way.

In one corner of the show-room is the compact air-compressing plant, occupying but small space, and capable of much work. The motor used in this installation is a ¼-horse power electric one; but any other form of motive power can be employed. In the basement-store under the show-room, one is shown where the



Interior Lamp for High-Pressure Lighting, with Two Ordinary Pressure Incandescent Gas-Burners at Sides.

Interior Lamp for "Half-Direct" High-Pressure Lighting.



Outdoor Lamp for Pharos High-Pressure Lighting, with Pressure Lighting and Extinguishing Arrangement at Top.

air is taken in through a filtering arrangement, in order that the compressed air supplied to the lamps may be absolutely free from extraneous matter. The pressure produced is equal to 51 to 55 inches of water. The compressed air and ordinary pressure gas mix in the burner or burners of the lamps. The burners and lamps are made for as low a light as 75-candle power up to three-burner lamps giving a light of 4500-candle power. The use of distance lighters with the high-power lamps is illustrated in the installation of three lamps outside the premises. There is a three-mantle (inverted) lamp of 4500-candle power, and two two-mantle (inverted) ones of 2000-candle power each; and the ease of lighting and extinguishing, by merely setting the compressor electric motor to work, is strikingly demonstrated. At night time these lamps make a brilliant display outside the premises. Inside the window are 1000 and 500 candle power lamps illustrating high-power interior lighting. One of these is surrounded by a screen of long crystals, and looks particularly effective; the other has the light enclosed in an ordinary opal globe, with wire protection. Inside the show-room is a 500-candle power lamp, containing an upright burner, with a large opal hemispherical globe at bottom, by means of which the light is largely reflected from the ceiling, and a soft and well-diffused illumination is obtained. This illustrates what is termed "half-direct lighting." Another lamp of more imposing characteristics, and with a long crystal screen around the high-power centre light, has attached to the gas-supply arms (for use with the ordinary pressure gas, and without the compressed air) two inverted lamps. The effect when all three are alight is exceedingly pleasing; but the small lamps can be used independently of the high-power light, or *vice versâ*, at will. A few words as to the efficiency of the Pharos light (which, it should be explained in passing, has merely been adopted by Mr. Norden as the system of high-pressure lighting that he, as a lighting engineer, specially advocates), the mixture of compressed air and ordinary pressure gas is in the proportions of 1½ to 1; and it may be noted that any increase of the pressure of the compressed air does not cause any change in the pressure of the gas. The highest efficiency that has been obtained with the light is 84 Hefner units per cubic foot of gas; but the guarantee is 70 candles. Of course, it will be understood that the system is equally adaptable to the compression of gas as of air.

Connected with this plant, there is also illustrated the burning-off of the uncollodionized mantles, the use of which is preferred for the Pharos lights, owing to their increased durability. The soft stockings are first tied to special metal rings, which are supplied with the burners; and are then attached by bayonet joint (as in the lamps themselves) to the burning-off burners. The first process is to burn off the stockings with a bunsen flame by a hand burner. Then the air-compressing machine is started; and, by the aid of the flame formed by the mixed ordinary pressure gas and compressed air, the mantle is shaped precisely to the form required for use on the burners in the lamps. The whole operation only takes a few minutes. From this description, it

* In the "JOURNAL" for July 6 last year (p. 32), some views were given of this arrangement as applied to outdoor purposes.

will be seen that this installation of the Pharos system is very complete for demonstration purposes, and that here the intending purchaser can see precisely what he is going to buy, the simple work entailed, and the efficiency of the lamps.

Next we are introduced to a very simple form of distance lighter—the invention of two German Engineers, Herr von Gahlern and Herr Schnorrenberg. The name given to this new distance lighter—"Gascho"—has been concocted from the first letters in the names of the joint inventors. The object of the apparatus is to enable street lamps, or any other large installation of lamps, to be lighted and extinguished from a central station, by a momentary increase of pressure, which need not (as demonstrated) exceed $\frac{6}{8}$ inch. The simplicity of the mechanism is its outstanding commendation; and, as in almost all things mechanical, practical simplicity is a sure way to efficiency in operation. A very brief examination shows the ingenuity and yet modest character of the apparatus. In the show-room, arrangements are provided, even to pressure-gauge, so that there can be an immediate testing of the operation of the mechanism, of its efficiency, and its applicability to single or cluster burners, and to partial lighting or extinction. The invention, in fact, is amenable to all requirements in this last-named respect. Below the burner we have a flexible diaphragm valve, connected with the upper part of which is a small arm which engages with a cog-wheel. The teeth of it are cut to meet the requirements connected with the lighting and extinguishing of the lamps. But taking the lighting and extinguishing of single burners, the teeth of the cog-wheel are cut equi-distant. On the pressure of the gas being increased to the slight extent already mentioned, the valve rises, the arm engaging with the cog-wheel moves it, and the gas supply is opened—the gas at the burner being ignited by a pilot light, fed with gas by a branch pipe from below the operating mechanism. When the lights have to be extinguished, similar slight increase of pressure gives the cog-wheel another movement, and shuts off the gas supply. Any necessary regulation of the diaphragm valve, in the event of a higher pressure being required, is obtained by the use of small discs, each representing $\frac{1}{4}$-inch pressure. Over the apparatus a white enamelled cap is placed, which serves the dual purpose of protector and reflector. The whole mechanism is outside the path of the gas supply; and thus no trouble can arise from the effects of gas on the operating parts. The system can be applied to either inverted or upright burners; the apparatus being supplied ready for screwing on to a $\frac{3}{4}$ or $\frac{1}{2}$ inch supply-pipe. Reverting to the point as to the pressure required, supposing the ordinary pressure is 2 inches, all that is needed at dusk for lighting up is a temporary pressure of $2\frac{6}{8}$ inches. This extra pressure from the gas-works is only needed for one to three minutes, according to the distance of the extreme lamps; and merely the same extra pressure is requisite for extinguishing the lamps at the end of the lighting hours. Neither a lower nor a higher pressure will hinder the operation of the mechanism in any way. It is necessary that the burners and bye-pass should be fitted with a gas-regulating screw for adjustment purposes.

Another novelty on view is a patent method for rapidly glazing and cleaning lamps; and there are two forms of doing the work. The lamps are circular; and the glasses used are semi-circular. In one lamp, there are two vertical ribs opposite each other; and these are grooved for the reception of the glasses. The bottom of the lamp is made with two flaps hinged to a central bar below the two uprights. These flaps are also grooved near their periphery. They are each held up in position, and let down, by a small lever. By letting down the flaps, the glasses can be slid into position, and the closing of the flaps completely secures them. There is no necessity to point the several conveniences of this simple means of maintaining lamps with an economy of labour. In the other form, the bottom of the lamp is, instead of being hinged, completely raised and lowered by means of a support with spiral movement.

The acetylene and air-gas plants have yet to be installed; but there are on view a 60-candle methylated spirit incandescent lamp, and a 50-candle petrol incandescent one. The former is a little more expensive than the latter; but it is certainly more efficient. Some beautiful pendant fittings of French design are on view, as well as reading and desk lamps. Arrangements have also been made for a display of other modern and novel types of fitting, together with mantles for all purposes. Altogether, it may already be said that the firm's "permanent exhibition" of gas-lighting systems and goods will be worth inspection; and it will be, as is intended, a convenience to those who are investigating merits for the purpose of purchasing that which will best suit their requirements.

The London and Southern District Junior Gas Association will hold a meeting next Friday, at the Cripplegate Institute, Golden Lane, E.C., when Mr. J. G. Clark, of the Gaslight and Coke Company, will read a paper entitled "Some Practical Aspects of Radiation, having Reference to Gas Lighting and Heating."

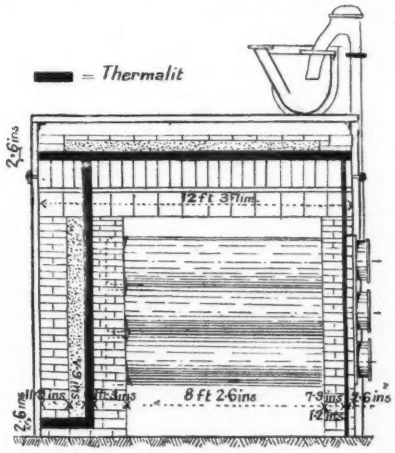
Eastern Counties Gas Managers' Association.—We learn from the Hon. Secretary (Mr. T. A. Guyatt, of Ely) that, as decided last September, the spring meeting of the Association will take place at Yarmouth, and that it will be held on Friday and Saturday, the 29th and 30th inst. The technical portion of the proceedings will comprise discussions on "Purification" and "Free Maintenance;" and on the second day of the meeting there will be a drive to the Yarmouth Water-Works.

PRICES OF ELECTRIC LAMPS.

It was at one time thought that the depression of metallic filament lamp prices by the German makers would not affect prices in this country, and that the manufacturers and wholesale dealers here would be able to continue for some time yet without lowering their rates of charge. But it is not so. Prices have been reduced. As to the cause, we care nothing. But it is solemnly averred that the reduction at this particular time by the leading makers in this country is in pursuance of a long-formed policy. The coincidence is striking. But after all, the reductions have not got attractively low enough; and, such as they are, they have not been made in the case of all lamps. Variously, 3d. and 6d. is the extent of the reduction; and low-voltage lamps are now priced at about 2s. 9d. and thereabouts, while high-voltage ones are marked at 3s. 9d. and 4s. The General Electric Company, the makers of the Osram lamp, led the way in this price-cutting business. Premeditation on the subject—a long while before the German break in prices—has (readers may believe this or not as they will) brought this about; and the sole and only object of this profit-sacrificing Company has been to assist the electrical industry "in its fight against gas." This recognition of the difficulties of the electricity-supply industry in this fight and the voluntary leg-up on the part of the lamp manufacturers, deserve reward. These good Samaritans have, however, made a bold advertisement of their altruistic proceeding; and, on cool examination, some little doubt is raised as to whether the pressure of competitors should not take precedence of self-sacrifice among the animating causes of the degradation of prices. The smaller competitors who have been operating against the larger ones, and whose number is sufficient to make itself seriously felt by the larger makers, have not been lowering their prices so hastily. Before Mr. Asquith, galled by his tormentors in the House, trotted out the now famous phrase "wait and see," these smaller competitors had adopted it as their policy in respect of this price-cutting. But prices are moving down very cautiously, as a metallic filament lamp cannot be made so cheaply as a carbon filament one; and the margin between cost and retail price, with middlemen to have a profitable look-in, will not stand much paring down. Still such as the reductions are, there must be a song as to their helpfulness in the fight with gas.

HEAT INSULATION OF RETORT-SETTINGS.

The use of "Thermalit"—a fire-resisting preparation of kieselguhr—for the insulation of retort-settings, has already been referred to in the "Journal" (Vol. CIX., p. 789). The method of applying it to an ordinary setting adopted by Herr Arnold, the Superintendent of the Gaudenzdorf Gas-Works, Vienna, is shown by the accompanying cross sectional view of a setting.



The layer of "Thermalit" which covers the crown of the arch is 65 mm., or about 2·6 inches, thick, as is also the layer at the back of the setting. The layer of "Thermalit" by which the face of the setting is insulated is only 30 mm. (1·2 inches) thick. The dimensions of the walls of the setting are stated on the figure. The insulation of the crown of the arch is said to be beneficial in protecting the hydraulic main and dip-pipes from the heat of the setting, while the insulation of the face not only protects the stokers but also greatly diminishes stoppages of the ascension pipes.

It was mentioned in the "Journal" a few weeks ago that Mr. P. C. Holmes Hunt, the Engineer of the Melbourne Metropolitan Gas Company, would pay a visit to England this summer. We learn that he left Melbourne on Monday last week, will travel *viâ* Canada, and is due in London towards the end of May.

A DYNAMITED GASHOLDER ABLAZE.

By William Key,

Formerly Manager of the Tradeston Gas-Works, Glasgow.

Never before had happened so singular an occurrence as that which is the subject of the present article, which, while destroying a gasholder, caused little danger to anyone, though afterwards there were great possibilities, which might have resulted in something more in keeping with the original intention, of bringing about great devastation and loss of many lives. The incident was so full of interesting, beautiful, and rarely-seen phenomena, that the author is tempted to place it on record, affording as it does another illustration of the fact, and further establishing the contention that, so far as gas stored within a gasholder—even under exceptional and violently destructive conditions—is concerned, there is no cause for alarm to those living or working in its proximity.

At the time of the occurrence in question, day and night shifts, each of twelve hours' duration, were in vogue; and the writer accustomed himself to spending some time on the works during the night—finding this to be an advantage, as he was frequently able to observe things which might escape notice during the busier hours of the day. On such visits, among other details, tests for illuminating power were carried out and recorded in the book kept for the purpose within the photometer-room, together with the date and hour of so doing; and in consequence of these tests the working conditions were often altered to meet requirements. The room was in the same yard as the gasholder mentioned in my former article (see *ante*, p. 30). The yard level was probably 40 feet above that of the general works, and was separated from them by the property of a Railway Company having numerous sidings occupying a width of probably 150 yards; but at the narrower portion communication was provided by bridge for cart and other traffic to the higher yard.

On this particular and eventful night, the author, after leaving the works, made tests in the photometer-room—the hour recorded being 9.50 p.m. He afterwards walked home, a distance of fully three-quarters of a mile. At 10.10 p.m., while he was sitting at the fireside, a concentrated, loud, and sharp detonation and concussion shook the house. Rushing to the door, he beheld 500,000 or 600,000 cubic feet of gas, forming an immense, gorgeous, and brilliantly illuminated cloud, gracefully and harmlessly rising in the atmosphere on a night otherwise very dark. Portions seemed to be boiling outwards from the mass in bright yellow exuberance of flame, like great masses of soft white steam as seen during sunlight.

Hurrying to a cab, the author was soon being swiftly carried back to the gas-works, only stopping to take up the Manager of the pipe-laying department. But as he seemed to be completely petrified, the author drove on without him. Arriving at the collapsed holder, he at once sent the night attendant to open the inlets and outlets of other holders; giving him four minutes for the first valve to be opened, telling him that he (the writer) would then shut the 24-inch inlet of the damaged holder, and immediately afterwards its outlet. Finding that immense flames still rose in the air from holes in the crown of the holder, the author decided to flood the inlet and outlet pipes by fire hose-pipe, placing the director into holes through the covers from which the thermometers had been withdrawn. These operations were over in a few minutes. Being anxious to learn in what condition the general works were lower down, the author hurried thither, but was intercepted by Mr. B., the then Deputy Town Clerk, who, leaving the crowd, desired to learn where the author was going, thinking all was not yet safe with the holder. But on being assured on this point, he took the author's arm, and accompanied him to the purifier-house, which had to be passed through in order to ascertain how the valves of the holders beyond had been left by the messenger. Suddenly leaving Mr. B., the author ran to the nearest holder and opened the inlet-valve—and not a moment too soon. On approaching the purifiers, he was horrified to find that his instructions as to opening the holder valves had not been carried out, and that the water in the lutes of all the purifiers was about to overflow—in fact, in some positions it was already overflowing. There were 500 retorts in active operation; and the conclusion come to was that the attendant had lost his head by fright, and had disappeared without carrying out his instructions. In a few seconds more the pressure of gas would have blown the seals of every purifier cover. Had another minute elapsed ere the author reached the purifiers, the atmosphere between the retort-house and the gasholders would have been charged with a highly explosive mixture of gas and air, which would have been fired at the lights of the exhauster-house or at the furnaces of the steam-boilers; and probably no one would have survived who could have told exactly how this second explosion had occurred, while the whole of the remaining works and gasholders would have been utterly destroyed.

Returning to the wrecked gasholder, the rise of the crown of which extended to about 11 or 12 feet above the ground level, the author and others witnessed the unusual sight of great roaring flames, 9 or 10 feet long, burning in an atmosphere of pure gas within the crown of the holder without igniting more of it than the volume of entering air sufficed to keep in the flame. The flames clung to the under side of the rising sheeting in the direction of the crown plates, rendering these brilliantly red hot; but they were extinguished by the gas at that length of flame for want of air. The holes would probably be 2 feet long by 10 inches in line lengthwise from the centre of the crown to the curb. Thus it was clearly demonstrated that even a powerful flame could not exist among the gas left in the crown of the holder, except for so far as the supply of sufficient air to support combustion allowed it to do so. The inlet and outlet having been properly sealed by water, huge flames still continued to burn to a considerable height from holes near the crown plate of the roof of the holder—probably caused by gas produced from spirit on the surface of the water in the gasholder by heat from the flames already mentioned and burning within the holder.

Experts declared that 5 lbs. of dynamite had been detonated on this occasion, whereby an opening 40 ft. by 30 ft. was made in the side of the holder; and through the sudden removal of this amount of surface of the side sheeting, the whole of the gaseous contents of the holder had escaped. About twelve months afterwards, the authors of this destruction were discovered in council within an enclosed railway arch; and from them it was learned that they had expected that on their charge being detonated the contents also of the holder would explode as if it were dynamite, and thus level all the houses south of the river, and kill most of their inhabitants. But no person was hurt. The damage done was simply loss of gas and the cost of replacing broken ties, purlins, and sheeting.

ANOTHER INCLINED CHAMBER SETTING.

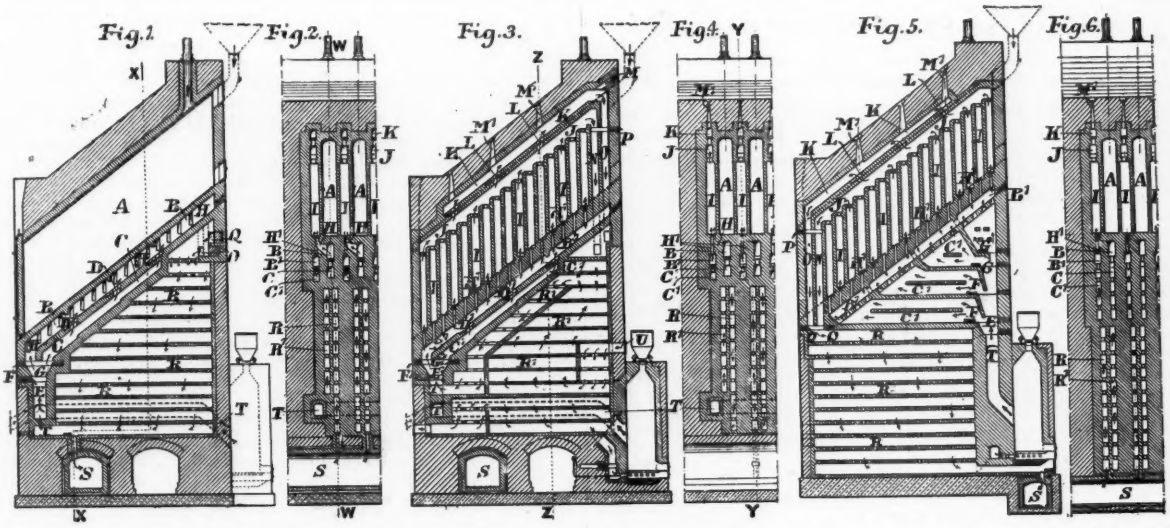
In the "Journal" for the 29th ult. (p. 874), we gave an illustrated description of two chamber settings patented in France by the Ofenbau Gesellschaft. Another setting of similar character has been devised by Herr Wilhelm Müller, who has also obtained a patent for it in that country. The following are its principal features.

The object of the inventor is the production of an arrangement susceptible of being regulated for the introduction and distribution of the gases and air in gas-furnaces and coke-ovens, particularly in inclined chamber settings directly in front of which the coke generator is constructed. The invention consists substantially in introducing the gases and air in proportions exactly determined for four or five heating channels, and in conveying separately to the outside the same quantities of discharge gas, so that in all parts of the walls an even heat (which can be regulated), and consequently a more rapid production of coke, are ensured. In the methods and constructions known up to now, the heating gases and the air are introduced from only one passage serving for all the channels, and the products of combustion are likewise discharged by a single channel only, so that the working of the setting is rather uncertain. It is claimed for the invention that by it these disadvantages are remedied.

The accompanying illustrations (p. 173) show an inclined chamber setting constructed in accordance with the patent. Fig. 1 is a longitudinal section of the coke chamber on the line W of fig. 2, which is a corresponding transverse section on the line X of fig. 1; figs. 3 and 5 are longitudinal sections of the heating surface on the line Y of fig. 4; and figs. 4 and 6 are corresponding transverse sections on the line *Z* of fig. 3.

The coal is charged into the setting by means of the funnel-shaped shoot shown at the top, from which it falls by its own weight into the chamber A. Below this and the heating wall is the principal distributing channel B B^1, having a regulating channel C C^1 beneath. The latter channel communicates with the others by means of the openings D D^1, which may be regulated from the outside of the setting by means of slides. At the entrance to the two channels B and C, there is the principal slide E E^1; so that the passage of the gases or the air may be entirely or partially cut off. The slides F F^1 or G G^1, which are situated above, serve to contract, in accordance with requirements, the entrance to the principal channel B B^1 on the regulating channel C C^1. From the former, openings H H^1 lead to the passages I, which end above in the channel J, above which there is a second channel K in communication with the lower one by means of openings L, capable of regulation by means of slides accessible through the side opening M, as well as from above through M^1. At their upper extremity, the two channels J and K are connected with the vertical channels N and O, which may in turn be regulated by the slides P Q. The conduits N and O end in the regenerator R, connected at its lower part with the flue S. The regenerator is divided in the well-known manner into two halves, one of which, R, is intended for the discharge gases, and the other, R^1, serves for the re-heating of the air.

The action of the setting is as follows: The heating gases coming from the generator enter at T, and are regulated by the slides E; they then pass into the principal channel B and the regulating channel C, separated by a partition, after having been equally regulated with respect to quantity by the slides F G before their entrance into the channels. The other openings D, governed by slides, are intended to distribute the ingoing gases in a group of four or five heating flues; the principal channel B serving as a compensator. The air required for combustion is introduced at U, passes through the regenerator R^1, and is there re-heated, accumulates at the lower part at T^1, and then takes the same course as the heating gases. The regulation of the quantity sent



in is effected in the manner described. It is therefore possible at all times to regulate the quantity of gas and air necessary for a group of four or five flues. From the channel B the heating gas passes into the flue I through the openings H, and the air arrives there from the channel B^1 through the openings H^1. This inflow of gas and air takes place at the floor level of the furnace, and both are consumed with an upward draught, and escape in the channel J through the openings which are contracted in the upper part of the heating channel. Just as the inflow of the gas and air is regulated, so must the discharge gases be regulated in equal quantities, in order that no obstruction may take place in the channel J. With this object, there is arranged in the upper part a similar system of channels to that below, so that the quantities of gas and air introduced at the bottom of a group of four or five channels may be regulated and conveyed away at the top by means of slides, without interfering with the draught of the neighbouring parts by an accumulation of discharge gases in the channel J. From the channels J and K the gases pass through the vertical conduits N O (which can be regulated by the slides P Q) into the regenerator R, where the heat inherent in these gases is transmitted to the fire-bars, and heats again the air conveyed into the compartment R^1. The waste heat passes by the channel S into the chimney, and escapes into the air.

Calorific Value of Gas in Wisconsin Cities.

Our readers may remember that a calorific power standard for gas has been adopted in Wisconsin, to the exclusion of one for illuminating value. At the recent meeting of the Illinois Gas Association, particulars of a number of tests in various cities were given in a short paper by Messrs. C. F. Burgess and W. J. Huddle; and one of the speakers in the discussion (Mr. W. E. Steinwedell) stated that the adoption of the new system was a "decided step in advance." He gave the following figures as the averages of the results (B.Th.U.) tabulated in the paper:—

	Coal Gas.	Water Gas.
Highest average heat value in any one place .	666 ..	673
Lowest ,, ,, ,, .	549 ..	545
Average heat value in all plants	619 ..	623

Mr. Steinwedell added that the ruling of the Railroad Commission as to the adoption of the calorific standard was most fitting and just, and ensured the public the best of service.

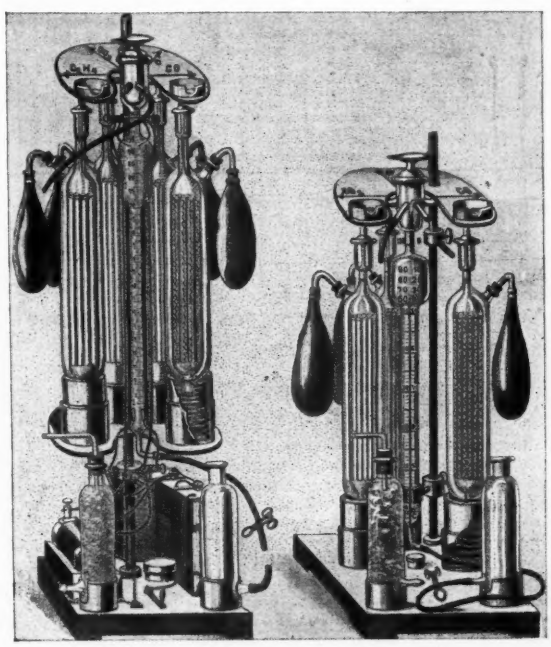
Manchester and District Junior Gas Association.—On Saturday, the 30th inst., at the Victoria University, Professor Harold B. Dixon, M.A., F.R.S., will deliver a second lecture to the Manchester and District Junior Gas Association on the subject of "The Explosion Wave in Gases." A report of the first lecture appeared in last week's "JOURNAL," p. 99.

Gas Undertakings Returns.—In the House of Commons, on Monday last week, the usual returns relating to the authorized gas undertakings of the United Kingdom were ordered; those relating to the Companies for the year ended Dec. 31, 1909, and in the case of the Local Authorities for the year ended the 31st ult. Last year the returns for 1908 and 1908-9 respectively were not ordered till the 4th of November; and they were issued just a month later.

Association of Water Engineers.—The Council of the Association of Water Engineers have awarded the following premiums (to take the form of books or instruments) for papers submitted last year: The President's premium, value £10, to Mr. S. R. Lowcock, M.Inst.C.E., for his paper on "Evaporation from Water Surfaces;" and Association premiums of £5 each to Mr. Alfred Towler, M.I.Mech.E., and Mr. Bruce M'Gregor Gray, Assoc.M.Inst.C.E., for their papers on "Steam-Driven Pumping Plant for Deep Wells and Boreholes" and "The Selby New Water-Works" respectively.

A NEW UNIVERSAL GAS ANALYSIS APPARATUS.

THE frequent introduction of a new pattern of apparatus for the analysis of manufactured gas and of waste gases is doubtless an indication of the wider use which is being made of analytical methods of control in works manufacturing gas for lighting and heating purposes. The "Chemiker *Zeitung*," in expressing this opinion in a recent issue, gave a description of a new form of apparatus answering all the requirements of the works' analyst, and of very great simplicity in use. The following is an abridged translation: The apparatus is the patent in Germany of Herren Fieber and Rohrbeck; and its special advantages consist in the fact that all rubber connections are dispensed with, and that the treatment and collection of the gas are controlled by a single



cock. This permits of the measuring burette being connected with the various absorption vessels and with the aspirator for drawing off the gas. Instead of using a rubber tube, each absorption vessel is provided with a capillary tube, which is ground to fit that of the cock; an air-tight junction being obtained by means of a spring which presses the two together. Another feature is that a separate explosion pipette is not employed; the hydrogen and light hydrocarbons being burnt in the measuring burette. The burette is provided with a pair of metallic terminals, connected to a small dry battery so that an explosive mixture of hydrogen and oxygen in the combining proportions can be generated in the burette when required, while a second pair of terminals in conjunction with an induction coil serves for the ignition of such explosive mixtures. Owing to the absence of rubber connections, the results are of a higher degree of accuracy; while the form of the apparatus renders it suitable for transport to any part of a works or system of mains. The apparatus is made in four patterns, the two simplest being for use where it is desired to make estimations only of oxygen and carbon dioxide, a third for the estimation of these two gases and of carbon monoxide and a fourth for a complete analysis.

PLANTINGA'S PRODUCER GAS SYSTEM.

A recent number of the "American Gaslight Journal" abstracts the specification of a United States patent (No. 522,700) granted in February last to Mr. Pierre Plantinga, of Cleveland, Ohio.

The invention relates to apparatus for use in the manufacture of gas—particularly the part which includes means for making producer gas, to be burned for the purpose of producing the heat required for further steps in the process. The object of the inventor is "to obtain a predetermined temperature resulting from the combustion of the producer gas, whereby such temperature may be made constant and the next step in the operation thereby rendered definite."

In the apparatus heretofore used, he points out, the supply of primary and secondary air has been more or less dependent upon weather and other extraneous conditions, which have caused the temperature of the burning producer gas to vary, and so vary the resultant gas product in a deleterious manner. This variation has heretofore been partly overcome by the employment of a high stack for taking off the gases of combustion; and one of the results of the present invention is to eliminate the necessity for a high stack—a material economic advantage.

Fig. 1 is a diagrammatic view of the apparatus suggested—showing a muffle-furnace and a gas-producer in vertical axial section. Fig. 2 is a similar view illustrating a modified form of the invention.

The gas-producer (of the usual form) is provided with two ducts A, for leading the primary air under the grate A^1, thence passing upwardly through the coal bed, and out of the top aperture A^2. Two branch air-pipes B^1 are connected with these ducts, and are themselves connected with an air-pipe B, affording a common, source of supply for the branch pipes. A diaphragm or valve B^2 consisting of a transversely placed movable plate, is placed in the pipe B, connected with a pressure device C; the latter being operated by means of a Venturi tube B^3 interposed in the pipe B, connected with the pressure-operated device C by tubes. A main D supplies the air to the pipe B. The pressure-operated device is so arranged that a decrease in the volume of air-flow past a given point per unit of time in the pipe B will cause the valve B^2 to open and permit a larger quantity of air to pass. In this manner, by adjusting the valve B^2, a constant rate of flow of a predetermined quantity of air through the duct B may be obtained, and therefore supplied to the producer. The latter is furthermore supplied with two ducts E, for leading the secondary air to the point where the producer gas is burned—such air being necessary for proper combustion at this point. The two branch pipes E^1 connect with the ducts E, and are themselves connected with a pipe E^2, affording a common source of air for both ducts. A valve E^3 is provided in the pipe E^2, and is connected with a second pressure device C^1, operating in the same manner as does the device C; a Venturi tube E^4 and tubes being provided for this purpose, as will be readily understood. The pipe E^2 is connected with the common main D. It will therefore be noted that a constant flow of air through the pipe E^2 may be maintained, and a constant supply of air be delivered at the point where the producer gas is burnt.

Above the producer (and enclosed) are the retorts which are heated by the flame produced by the combustion of the producer gas below. An opening (not shown) is provided in the enclosing

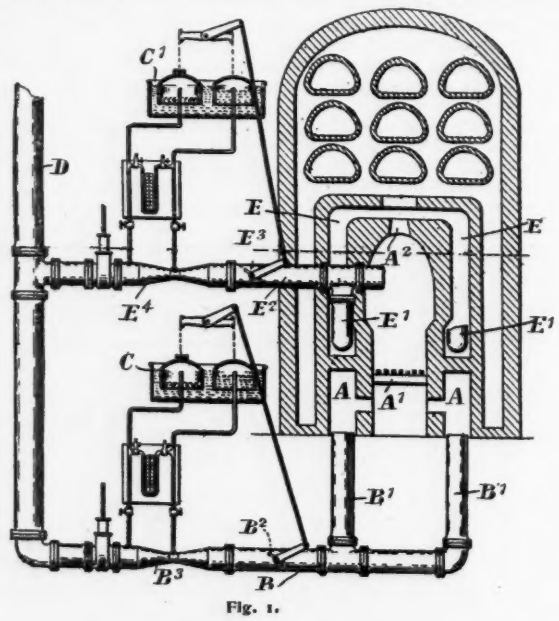


Fig. 1.

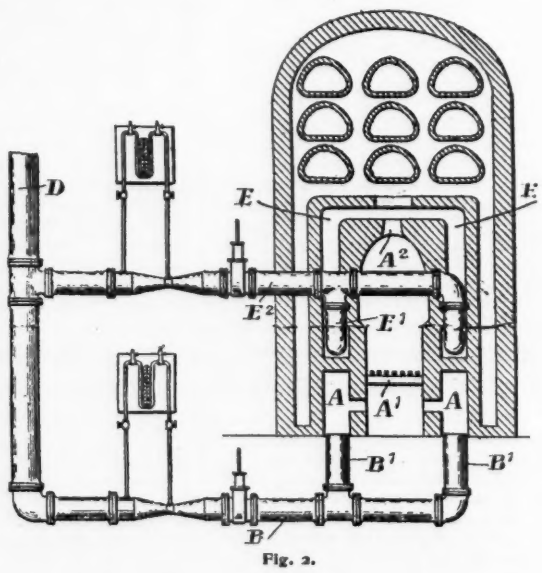


Fig. 2.

structure for conducting away the products of the combustion of the gas. By adjusting the valves B^2 E^3, it will be seen that, "after the quality of the gas and the quantity of air have been predetermined to produce the most economical combustion of the gas, these predetermined conditions may be maintained so as to maintain a constant temperature to which the retorts are subjected."

In the modified form of the apparatus, shown in fig. 2, the automatic feature is omitted, and the device arranged so that it may be manipulated by hand. In this case, the pressure-operated devices are omitted, as well as the automatically operated valves B^2 E^3. In place of these latter, two hand-operated valves are supplied. The Venturi tubes are connected with pressure-gauges, by means of which the flow of air through the pipes B and E^2 may be read. By operating the valves, therefore, the predetermined quantity of air may be supplied to the producer and to the tubes B^1 E^1, so as to bring about the conditions above noted. In this case, however, an attendant is required to operate the valves when the corresponding gauge indicates a diminution or increase of the flow.

The patentee claims: (1) In apparatus for use in the manufacture of gas the combination of a gas-producer; means for supplying the primary air to the producer; means for supplying the secondary air to the apparatus; and means for automatically regulating the flow of such secondary air—so as to maintain a flow of constant volume per unit of time past a given point in the secondary air duct. (2) The combination of a gas-producer; means for supplying the primary air to the latter; means for supplying the secondary air to the apparatus; and means for automatically regulating the flow of such primary and secondary air—so as to maintain a flow of a constant volume of air per unit of time past a given point in their respective ducts. (3) The combination of a muffle-furnace; a gas-producer; means for supplying the primary air to the latter; means for supplying the secondary air to the apparatus; means for regulating the flow of such primary and secondary air; and means for measuring such flow—whereby the flow of air through the primary and secondary air-ducts may be made of a predetermined volume per unit of time past a given point in such ducts respectively.

Power Transmission by Belts.—At the last meeting of the Junior Institution of Engineers, Mr. R. F. Krall read a paper on this subject. After offering a few observations on belt driving in general, the author proceeded to describe a system of driving by a thin steel belt (the material being specially manufactured and of very high temper) which is being extended in Germany and Belgium. The method of making the joint was illustrated, and an interesting table of results of experiments conducted by Professor Kammerer, of Berlin, at the Charlottenburg University, was given, as also one containing comparative figures relating to power transmission by ropes, leather belts, and steel belts. In considering the advantages of the last named, it was pointed out that, as they do not stretch, the trouble of taking-up is eliminated, and no tension is required to allow for stretching. As compared with leather and fabrics, very much narrower belts can be employed, varying between a third and a tenth of the ordinary width, saving much in cost of installation. Speeds up to 10,000 feet per minute can be employed. Another form of belt driving, in which belts in common use are employed, the invention of Captain Leneveu, a French artillery officer, and known as the "Lenix" system, was also described. Its essential feature was a pulley freely floating on the belt; the pulley being mounted on an arm with adjustable counterweight, this pulley being placed near the belt pulley, and the arm capable of moving about the centre of the belt pulley, or as nearly so as might be conveniently arranged.

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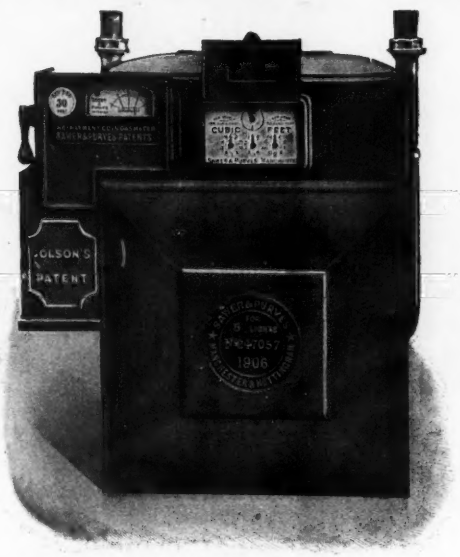

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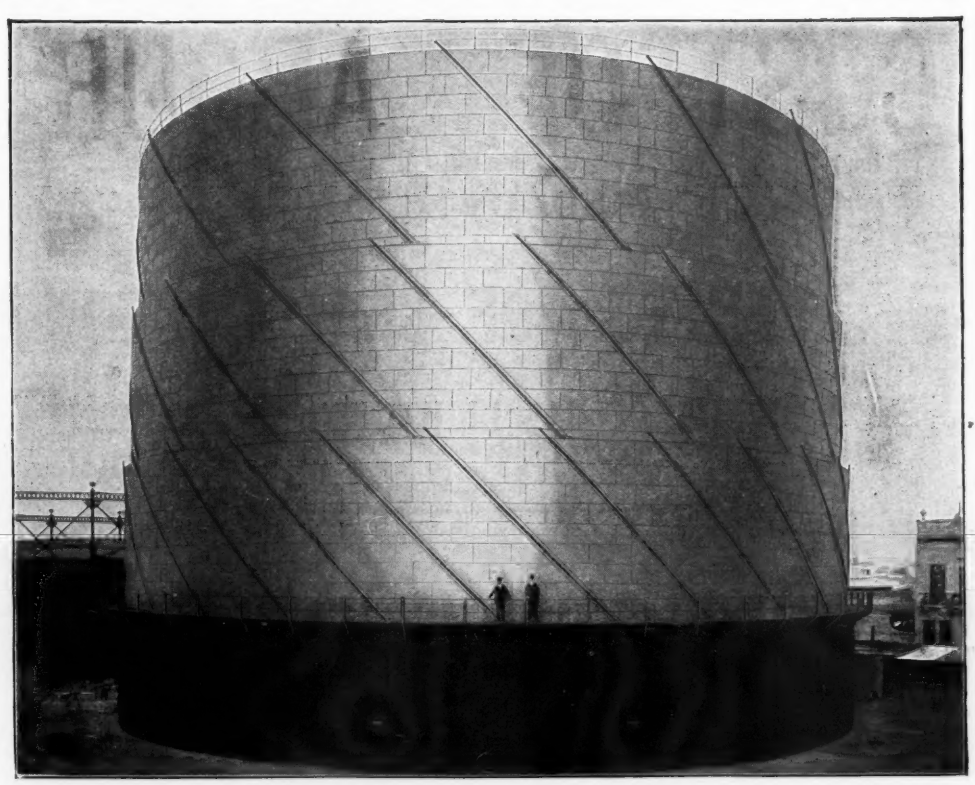

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MEASUREMENT OF LIGHT AND ILLUMINATION.

At the Meeting of the Illuminating Engineering Society last Thursday—the PRESIDENT (Professor Silvanus Thompson) in the chair—discussion on the above subject was continued; the aspect of the question on this occasion being practically limited to the measurement of illumination. The first part of the discussion was reported in our issue for March 22 (p. 809).

At the outset a communication was presented, but not read, from Dr. W. E. Sumpner on the direct measurement of mean spherical candle power by diffusion methods. In the introduction to the paper, he remarked that the quantity of light emitted by any form of lamp is measured by its spherical candle-power. The determination of this quantity is of commercial importance; and a simple method of making the test is much wanted. The best known direct test is by the use of the Ulbricht globe. This globe no doubt yields good results in practice; but it has some defects which prevent its action from being quite accurate. The author alluded to these sources of error, and then discussed at length whether it is possible to obtain equally good or better results by using, in place of the globe, merely a rectangular box. Concluding the paper he had a few words to say about units. It will, he said, be a pity if the Illuminating Engineering Society help to perpetuate the use of such a cumbrous artificial expression as "mean spherical candle-power." This quantity no doubt represents the output of light from the source; but its value can only be obtained by first of all measuring the output itself. In connection with electrical theory, Oliver Heaviside has declaimed at the irrationality of estimating the output of a source by the flux it produces at a distance. It is still more irrational when the source, as in the case of light, is of such a nature that we have to imagine an artificial mathematical concept styled a "mean spherical" flux, existing no one knows where. In the case of electricity, the rationalizing of the units is now difficult, if not impossible. The international units are already fixed. In regard to light, this is not yet the case, in spite of all the congresses whose deliberations have contributed to leave the subject in its present unsatisfactory state. It is to be hoped, in respect of light, that "rational" units will in the end be adopted; and that the unit of light will refer to the total output of the source, and not to its candle-power in any real or imaginary direction.

Mr. A. P. TROTTER thought the questions that had been circulated gave an excellent lead to the discussion of this subject. The sixth query was, "What are the main qualifications of an illumination photometer for practical work? With what degree of accuracy can the illumination in streets and buildings be measured, and what limits of accuracy should at present be permissible?" The very first qualification one came to had been a matter of keen dispute for certainly eighteen years; and there were still differences of opinion about it. The point was as to whether the surface by which measurement was made should be horizontal or inclined. He claimed that it should be horizontal; the reason being that it enabled one to sum up all the lights under observation. The illumination received must be on something which would take it all, and give it all an equal chance. Therefore, one of the first essentials in illumination was a horizontal test plate or screen, and one which had no obstruction. The second point he thought was that the illumination photometer should be free from glaze and angle errors. The third qualification was that, in an illumination photometer, the portable standard of light should be a good one. There were in use a number of different lamps. The Germans frequently used a benzene lamp. The pentane lamp, too, could be adapted for carrying about. But nowadays most people would take an electric glow lamp. With a benzene lamp, they could only hope it would remain steady throughout an evening. With an electric lamp it was only necessary to light up for twenty or thirty seconds at a time; and the sum of all the work that one had to do in a long evening would not amount to more than half or three-quarters of an hour. But the lamp should be checked before and after, as he had had one or two evenings' work thrown away, on finding a difference of about 15 per cent. between the time he went out and reached home, owing possibly to a loose contact somewhere. The next thing was the range. A great many excellent photometers would work with a range of about 1 to 10; but that really was not enough for most purposes. A range of 4 foot-candles would be; and if one came across a brighter light, a photometer should have some means of increasing the range. But it was necessary to come down to about 200ths of a foot-candle. One of the most important things in street illumination was the minimum, because that was where the dispute would arise in any question as to a contract. A photometer had to be almost at its best at the critical point. Therefore, he thought the instrument should come down to 200ths of a foot-candle; if one could get lower, all the better. But when one came to 100ths of a foot-candle, one could not depend on any great accuracy. The fifth qualification was capability of dealing with coloured lights; and he must confess that he thought the admirable principle of a gradually moving adjustment was about the best. The President in his address referred to the bunsen as a time-honoured and over-rated thing; and he (Mr. Trotter) might apply that to the flicker photometer. The next qualification was portability. Those who had had to do with street illumination, would recognize the advantages of this. He was rather sorry that, in the publication of street illumination tests, the observers did not give the means. With a bunsen photometer, carefully set up in a street, one could get a reading to 2 per cent., and that, in his opinion, was all it was worth while to do, for street purposes. Gas pressures and voltages varied; and to go to anything below 2 per cent. in street lighting was out of the question. Even in measurements taken every quarter or half hour, variations were obtained. If on repeating a number of tests under the same conditions, in the same position, and with the same lamp, results could be obtained within a range of 5 or 6 per cent—2½ or 3 per cent. from the mean—the result might be said to be a very good one. Supposing a contract had been made for street lighting with a minimum of 0·1 candle-foot, and a minimum was found of (say) 0·0958, what was to be done? He thought it reasonable to take a fair view of error for street lighting.

Mr. LANCELOT W. WILD spoke of the sensitiveness of photometers. The practice he preferred was to take a series of measurements, first moving the carriage from the left until one ceased to see there was any out-of-balance, then to move the carriage to the right until one again failed to find any out-of-balance, and then to take the difference between the two. These pairs of settings should be repeated again and again at least a dozen times, and the average taken of the different pairs. In this way, he had tested a good many photometers; and he had picked out some of the most notable examples. The results he put under the heading "Insensitiveness of Photometers." There were two columns—one for the equality of brightness, and the other for the flicker principle. Starting with the Joly prism, the equality of brightness was 2·5 per cent.—that was to say, there was 2·5 per cent. between the average of two settings from left to right, and the probable error of any setting would be 1¼ per cent. The fault of the Joly prism was the separation between the two surfaces; if the greatest sensitiveness was to be obtained, the surfaces must be contiguous. As to the Simmance-Abady flicker photometer, the equality of brightness came out to 2·4 per cent. There was the same trouble as with the Joly prism, that the two surfaces were separated by the black line edge of the wheel. When used as a flicker, the sensitiveness was much better—about $\frac{1}{6}$ per cent.; and the black line between the two surfaces was of much less consequence when used as a flicker. Turning to the Whitman sector photometer, used stationary. It was simply one card in front of the other; the observer looking past the one edge to the other. But the fault was that there was a certain amount of raggedness at the edge of the card. The equality of brightness obtained was 2 per cent.; and as a flicker, 1 per cent. With inclined cards, he got the equality of insensitiveness down to 1·2 per cent., using only one eye; when he used two eyes, then he found that one surface would dart out brighter than the other. When he came to the common bunsen, he found the equality of brightness was better viewed one side than when viewed on both sides. Viewed one side, it was 1·2 per cent.; viewed both sides, 1·5 per cent. Then with a special bunsen (38 lb. Ford), viewed one side, the equality of brightness was 0·4 per cent.; used as a flicker, 0·8 per cent. Viewed both sides, the equality of brightness was 0·8 per cent.; used as a flicker, 0·2 per cent. With another special bunsen (60 lb. Ford) viewed one side, the equality of brightness was 0·8 per cent.; viewed both sides 1·2 per cent.; and used as a flicker 0·4 per cent. With the Lummer, the equality of brightness was 0·7 per cent., which was not so good as with the bunsen.

Mr. J. G. CLARK (Gaslight and Coke Company) said he could not share the bad opinion that some members had expressed with regard to the bunsen disc. It was part of his duty to keep an eye on the quality of mantles for the Company whom he had the pleasure to serve; and for this purpose he found the bunsen disc a very useful piece of apparatus. In the first place, one could work for long periods without fatigue, which one could not quite say in the case of appliances which had optical fittings, such as small telescopes. Another thing, it would permit adjustment being made while one was looking on the screen, which was rather an important matter. Then in regard to testing lamps he very much preferred testing a lamp to ascertain its lower hemispherical value. A good deal of interest had lately been taken in integrating photometers; and, of course, it was very nice to be able to ascertain such an important value by one observation. But he must say that, after very careful thought on these questions, he could not really see they could do with anything less than a complete distribution curve of a lamp, to know not only how much light was coming from it, but where it was going. It was fairly well recognized that a source of light was a sort of raw material of the lighting business; and it was necessary, having got an efficient source of light, to consider the best method of distributing it by means of reflection. If one only knew the total flux of light—the spherical value—one was not much better off. One had no data on which to base calculations for the design of reflectors and refracting apparatus. So that one could not do anything until one knew the total hemispherical value; and one must have a complete distribution curve. He was not at the last meeting of the Society; but he had the pleasure of reading Dr. Sumpner's remarks on spherical values. He stated that the subject divided itself into two parts—first, in regard to glow lamps; and, secondly, in regard to arc lamps. He presumed Dr. Sumpner had not yet heard of gas-lamps. [Laughter.] If spherical values had to be considered as a commercial method of evaluating a source of light, they must not forget that gas-light was with us, and doing useful service. This question it was his business to examine; and he had to do it with quite a large number of lighting units—not

merely a large number of lighting units of the same kind, but of different kinds; and it took up a fair amount of time. He had therefore considered whether he should adopt the integrating method. But he must confess he should not be any better off. Although it took some little time to get a complete distribution curve, yet the value of the curve was very much too important to overlook, and the time necessary was well spent. Therefore he did not think he had much to gain by adopting the integrating method. When one had an illumination curve, one could calculate the spherical or hemispherical value just as required. For testing lamps, and obtaining a distribution curve, he always used the Simmance-Abady flicker photometer. In his experience, it was eminently adapted for the work. It had very precise methods for measuring angles; it was easy to manipulate; and, as a matter of fact, one could get a distribution curve of a lamp in about an hour, which was not a long time. There were one or two important points with regard to the flicker photometer. In the first place, there was the speed at which the flicker wheel should rotate. That depended upon the illumination that had to be measured—for instance, in practical use, there should be a slow speed for low illuminations. With regard to the public lighting of London, there were many installations of various sorts; and it was very necessary they should be maintained at their proper value. He found it was convenient to conduct the work on the basis of candle power illumination. That was highly important: and it was the thing to be desired. When an installation was once fitted up, and the candle power of the lamps and the height were adjusted to give the desired illumination, a knowledge of the candle power which produced the illumination could be taken as an index of the value of the illumination from time to time—that was to say, if a particular lamp, giving 900 to 1000 candles, was found to produce the desired illumination, then the measurement of this candle power at periodical intervals would ensure the illumination always being up to the mark. He used the Simmance-Abady flicker photometer for street-lamp candle-power measurements; it was a very handy instrument for out-door work, which had to be conducted under fairly rough-and-ready conditions—conditions rather different from the laboratory. The photometer was handy; and it could be set up quite firmly, which was sometimes an important matter in thoroughfares subject to heavy traffic.

Mr. HAYDN HARRISON did not think spherical candle power would help them in any way. As to the question of the main qualifications for a photometer for practical purposes, it depended on what were called "practical purposes." He had had to test upwards of 150 gas-lamps in one evening, averaging 80 yards apart; and if he had used a photometer that required five operations to make one measurement, he could not have got through them. What was wanted was simplicity. He could not agree with Mr. Trotter as to neglect of small percentage differences in the testing of street-lamps. For practical work, he objected to a horizontal screen because of the difficulty of measuring low illuminations. As to the permanency of the standard, he used a small tungsten lamp, because the variation was less than in the case of any other. Respecting the point of accuracy, he never tried in street tests to get within a greater accuracy than 5 per cent. For indoor work (it depended upon how much time one had to spare), one could work to within 1 per cent. For rapid work, he preferred to use the flicker.

Mr. P. J. WALDRAM thought the architect required to be better educated not only with regard to the artificial illumination of buildings, but as to their daylight illumination. He went on to speak of the measurement of the latter.

Mr. P. E. EDGCUMBE joined issue with those who advocated the calculation of illumination from the measurement of the candle power. Reflection from houses and the conditions of the street generally had an important bearing on the horizontal illumination; and in measuring the candle power in streets and parks, one found an enormous difference. Therefore he did not think it was quite sufficient to measure candle power, and then to calculate the horizontal illumination. If a flicker was used, the screen should be at right angles to the rays; and his experience was that the flicker was very insensitive at low illumination.

The PRESIDENT, in closing the discussion, asked whether it would not be possible, if they were going to add up illuminations, to take the measurements in two halves, and then add together. That ought to be very correct. He was not sure they were taking into account all the elements that should be dealt with when they took separate illuminations in different directions, and then added them together. The reflection from bright and dull surfaces around, had never been taken sufficiently into account. The discussion that night had been a fruitful one, and certainly more practical than any that had preceded it.

Crude oil was applied to the earth embankments of a reservoir recently constructed at Los Angeles (Cal.). When the banks had been dressed to the finished slope, according to the "Municipal Journal and Engineer," they were swept down lightly to remove surplus loose earth, and sprinkled with light crude oil brought to the boiling-point. This was allowed to sink in and dry for a week, and then a second coat of oil was applied; no other form of lining being used. The first coat required 10 barrels of oil for an area of 80 ft. by 30 ft., and the second coat about half this quantity. The oil cost 95 c. per barrel, and the labour for applying it was four men four hours each—costing $4·75.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The last ordinary meeting of the present session was held on Saturday, at the Bradford Technical College. In the enforced absence of the President (Mr. S. W. Shepherd), the SENIOR VICE-PRESIDENT (Mr. F. Scholefield) occupied the chair.

OUTSIDE EXTENSIONS FOR A SMALL GAS UNDERTAKING.

Mr. J. DEMAIN (Garforth) read the following paper:

This short paper is intended to serve a double purpose. First, to give particulars of what has been done at the writer's works; and, secondly, to raise a discussion on what has been done, and is being done, in other works.

When I was appointed in the early part of last year to my present post, I found a considerable amount of work in the distribution department ready for a start as soon as the weather and other circumstances would permit. Owing to the adoption of public lighting by the District Council, and applications for a supply of gas from out-districts, considerable extensions to mains were found to be necessary to enable us to be in a position to give a supply to the lamps, &c., in the rather scattered area. This, coupled with the fact that some of the other out-districts were rather short of pressure owing to the nature of the district, decided my Directors on the extensions; and, at the same time, it enabled us to connect two or three dead-ends of existing mains, and so make several complete circuits on the system.

Work was started the latter end of April, in the laying of mains only, and finished the first week in August. During this time, 2¼ miles of 3, 4, and 6 inch pipes were laid, all on the main roads under the footpaths; the District Council having given their consent to them being placed there. This work was done in addition to our ordinary work, repairs, &c. Besides this, services were laid to about 50 public lamps (70 had been erected the year before) and upwards of 170 new consumers. The total length of pipe required amounted to about 1900 yards, varying in size from ⅜ to 1¼ inch.

The work was done by our own men, excepting the digging, the whole of which was carried out by contract, to which I shall refer later. Our own man did the pipe laying and jointing, with the help of a labourer; and these two men, along with the digger and mate—four men—did all the work of laying the mains. The average number of lengths of 3-inch pipe laid in one day was about 30; the highest number laid in a day was 43 lengths—*i.e.*, 129 yards. This, I venture to think, is rather quick work. Of course, it must be taken into consideration that very few connections were taken off, or otherwise this length of pipe could not have been laid. The mode of working was for the digger to start about 6 a.m., and commence getting out the trench until about 2 o'clock; our man in the meantime getting the pipes knocked-up in lengths, three pipes to a length, ready for lowering into the trench first thing after dinner. About the middle of the total length, another hole was drilled for bladdering, so that when one-half of the pipes were laid and jointed, they could be tested, and the men start to fill in; the digger electing to fill in each night in preference to employing a watchman. In the service laying, only three men were employed—*i.e.*, fitter, labourer, and digger; the labourer pointing all holes after the pipe was put through the walls.

One reason why we proceeded so quickly was undoubtedly on account of our not having to wait for any digging getting out. This work, as I have already mentioned, was done by contract; the price being 6d. per yard for mains and 4d. per yard for services. These prices included excavating and refilling and employing a watchman when necessary, and taking all risks. The price undoubtedly paid the men well, and at the same time enabled us to proceed very quickly with the work. I think that, had we employed our own men in excavating, the work would certainly have cost more; and I doubt whether we should have got on so quickly. I might mention that part of the main-laying work consisted of replacing our trunk main with a 6-inch pipe.

We originally intended to do all the house-fitting ourselves; but owing to the number waiting to be fitted, we decided to let about ninety by contract to the local plumber—the Gas Company finding all material, the plumber supplying the labour only, and the work being paid for at the rate of 1s. 9d. per point. Three or four points were fitted to each house—*i.e.*, three lights and separate connections (where necessary) for small stove—the contractor making good all holes, &c., and leaving everything in good condition. We found that by doing our own fitting work we could save quite 5s. per house, when compared with the usual charges made for slot-installation fitting; and future work of this description, I should have no hesitation in carrying out by our own labour. We supply the consumer with one pendant, two brackets, and stove connection; the stove being either a boiling-ring or oblong griller. Cookers are out of the question, as our district is principally a colliery district, and the men are allowed a load of coal every month at a very low price.

The type of lantern employed for the public lighting is the ordinary square lantern made of copper throughout, and fitted with opal glass in the top to serve as a reflector. All the lanterns are fitted to iron pillars; no brackets being used in any part of the district.

The No. 3 Kern burner was chosen as the most suitable one; and this, in conjunction with a governor (which is fitted to every lamp), gives complete satisfaction. The lighting is by means of Messrs. Alexander Wright and Co.'s flash-light sticks.

Now, as to the result. Though the bulk of these extensions were not completed before the end of September, our output increased by no less than 22 per cent.; and this year we anticipate our output to be over 9 million cubic feet.

Discussion.

Mr. ROBERTS inquired how much of the fittings for public lighting was supplied by the Company; in other words, did they or the Council provide the lanterns and columns? Had Mr. Demain really found it necessary to use governors in conjunction with No. 3 Kern burners? He knew cases where a small check-cock was used instead of a governor, set after testing each lamp *in situ*; and the arrangement seemed cheap and satisfactory.

Mr. M'NAB asked whether it was simply an assumption that the increased leakage was due to ungoverned burners, whether they instituted any tests or had measured typical lamps.

Mr. FLIGG inquired as to the size of trench excavated at 6d. per yard. He said he could not let contracts at any such figure. Was the soil specially easy of removal?

Mr. DEMAIN replied that the Council provided the columns, lanterns, &c.—in fact, everything except governors; but as they had no men accustomed to such work, the Gas Company fitted up the lanterns for them free of charge. He certainly was inclined to insist on governors even for No. 3 Kern burners. Their previous batch of street lights had been installed without governors, and a great increase in unaccounted-for gas promptly followed. The adoption of governors had corrected this, and secured better lighting. At his previous works, he had had much the same experience; and on testing ungoverned burners, taken at random, he had found their consumption excessive—amounting in a few cases to even 7 and 8 cubic feet per hour instead of 3¼ cubic feet as stipulated. They had no meters on any street lamps, but charged on a consumption of 3½ cubic feet per hour, and endeavoured to keep to this rate of burning by means of governors. He preferred them to check-cocks, which would not get over the difficulty of varying pressures, while the individual testing of lamps would be almost impossible over a large district. Their trenches were about 15 inches wide and 2 feet deep; and the soil found was of all kinds, including even rock that needed blasting. Clay was, however, the main thing met with. The man who did the work was a reliable and quick worker, who averaged 30 lengths a day and actually accomplished 129 yards on some days. He had been concerned in another rural district with the laying of 720 yards of Mannesmann pipe across fields, &c., to supply a mansion, and a trench 18 inches deep was done for 2½d. per yard.

Mr. SCHOLEFIELD asked what proportion of the new installations was supplied with slot meters, and whether any agreement was signed; what did the author do with grillers and boiling-rings when tenants left?

Mr. FLIGG and Mr. M'NAB asked further questions as to the average consumption of gas per slot-meter, and as to what was done with very small consumptions.

Mr. DEMAIN replied that he did not like agreements with slot-meters, which were mainly what they put in. They supplied 18 cubic feet of gas for 1d., and were soon going to give 20 cubic feet. They provided a cheap griller and a boiling-ring and a length of flexible tubing, and fitted these free. They practically gave them to the tenants, and were repaid by the gas consumed and the rate charged. They did not ask for their return, and, in general, considered themselves amply repaid even if they were never sent back. They did not even take them out in cases of very small gas consumption. The fittings had been put in, and they would rather leave them and hope for increased business or new tenants. They had not yet had a full year with the bulk of their recent additions; but their previous slot-meters averaged 6500 to 7000 cubic feet per annum. If this seemed low, it was to be explained by the fact that theirs was a mining district, and that the miners had a monthly allowance of cheap coal, which was always duly burnt. There was therefore small inducement, and still less inclination, to use gas for cooking.

Mr. HALKETT paid tribute to the interest of the paper, more especially in its showing how cheaply the work described could be carried out. He did not think it a wise policy to lay pipes in lengths of three, especially with only two men. [Mr. DEMAIN: The 6-inch pipes are laid in lengths of two only.] There must inevitably be some strain, and this would show itself in the future. It was unwise to save a little money at the outset by methods which would soon mean loss from leakage and a further heavy charge in baring and repairing the mains. He could substantiate what had been said about fitting charges. A gas undertaking ought to do this work by its own men whenever possible. Better work was likely, more supervision would be employed, and a greater interest taken in the work in making a good job of it. It was cheaper to use direct employment in this way, as consumers' wishes and needs would be more likely to be ascertained and met, and future developments more likely to follow. He was surprised to hear that no agreements were demanded. What claim had they on landlords or tenants who might eventually claim the gas accessories as fixtures? It was certainly more usual to have a signed permission from landlords and tenants for the installation of fittings, &c., and an undertaking by the tenant to keep them in order.

Mr. FURNESS (Slaithwaite), the representative of the Manchester District Institution, wished to bear emphatic testimony to the advisability of laying mains one length at a time. The important matter was not so much the saving of a little time or money at the outset, as making so good a job that it should remain in sound condition for a long term of years. In laying two or three lengths at a time, there was the serious disadvantage of not knowing what kind of ground support was under the intermediate joints, as it had not been disturbed. It might consequently be of a nature that would lead to subsidence and drawn or fractured joints, or it might be thinly covered stone. With single lengths, each joint rested on examined and disturbed soil. In some recent extensions, he had let the trenching by contract; but he found he had to pay from 10d. to 1s. 3d. per yard.

Other questions by Mr. TAVERNER, Mr. FLIGG, and Mr. M'NAB dealt with the percentage of unaccounted-for gas, the kind of joints made, branch-services, &c. Many remarks were made about the extremely low charges for digging, and repeated queries about the character of the soil.

Mr. ROBERTS, speaking from his personal knowledge of Mr. Demain's district, quite realized that these low charges were fair payment for the work done. The soil encountered admitted of no comparison with that found in most of the districts represented at the meeting. Many of the pipes would be under footpaths, which were simply ashes laid upon, and embedded into, the natural soil.

Mr. DEMAIN assured the meeting that the trench-digger whose exploits aroused so much admiration and wonder, almost amounting to incredulity, was a quick worker; but he was really well paid, and had even earned £3 in a day. The mains were mostly laid under footpaths, and no joint was filled in until he himself had tested it under gas pressure; and he had taken particular pains to satisfy himself as to their soundness, as many lengths of the pipe would not, in all probability, need to be disturbed for thirty years, so long as they were sound. They did not take each service off separately from the main, and in some cases were able to branch-off four services from a single connection. Their unaccounted-for gas was 10 per cent. for the last half year; but it was a colliery district, with workings as near as 110 yards below the surface, and a 4 to 4½ foot seam there. Only lately he had had a brand new main broken clean across, from subsidences of the ground. The joints were all the old-fashioned lead ones. Only the 3-inch pipe was laid in three-length instalments, and four men were utilized for lowering it into the trench.

Mr. W. CRANFIELD then gave an address on "Modern Developments of Carbonization Methods, with Special Reference to Vertical Retorts." The Yorkshire and the Manchester Junior Associations are paying a joint visit to the installation of Woodall-Duckham retorts at Burnley on the 7th prox. This address was therefore designed to prepare the way, and, by familiarizing members with the design of the plant and the details of its construction, to secure a more intelligent inspection of the actual setting. Two very large diagrams, kindly furnished by Messrs. Woodall and Duckham, Limited, were on view; and a large selection of lantern slides (mostly prepared for the occasion) not only made this type of carbonizing plant clear, but the other vertical retort systems, the various chamber settings, 45° inclines, &c. The details of their construction, the results of their working, and the explanation of these results were dealt with.

A deputation of the Bradford Gas Committee have, as has been recorded in the "JOURNAL," lately visited the chief Continental examples of chambers and vertical settings, and have reported in favour of verticals. The full Committee are now about to visit the chief English installations before coming to a final decision. There was consequently special timeliness and appropriateness in holding the meeting at Bradford, where also Mr. Cranfield is lecturer in Gas Technology at the Municipal Technical College. The Bradford members of the Association were well represented. Several of the Works Superintendents were present, and much interest was shown in the address and its illustrations, in the comparison of the systems, and in their relative advantages.

The two speakers were cordially thanked on the motion of Mr. H. SMITH, seconded by Mr. G. W. FLIGG.

Garcke's "Manual of Electrical Undertakings and Directory."—We have received from the Electrical Press, Limited, of 37 and 38, Strand, W.C., the new edition (the fourteenth) of this work, which contains many new features in comparison with its predecessors. The book is a bulky one, as may be supposed when it is stated that as many as 3000 electrical undertakings are dealt with in its pages. The contents are grouped in six divisions; the first being devoted to electric lighting, power, and traction undertakings, and the fifth containing directories of officials, members of electric lighting and tramway committees, and electrical contractors. This division has been considerably amplified, and will consequently prove more valuable than before. It contains 12,000 names, but they are only those of gentlemen holding responsible positions. The main body of the "Manual" is made up of particulars relating to all the joint-stock electrical companies and municipal electrical undertakings at home and in the Colonies; and the other features of the book include a general survey of the past year (introduced for the first time in the preceding volume) and some interesting comments upon financial, legislative, and other matters connected with the industry. The text is given of the Electric Lighting Act, 1909, and also of the London Electric Supply Bill of the present session. The "Manual" has been compiled under the direction of Mr. Emile Garcke, M.I.E.E., and every effort made to render it a complete and thoroughly reliable work of reference for the electrical industry. The price is 21s. net.

REGISTER OF PATENTS.

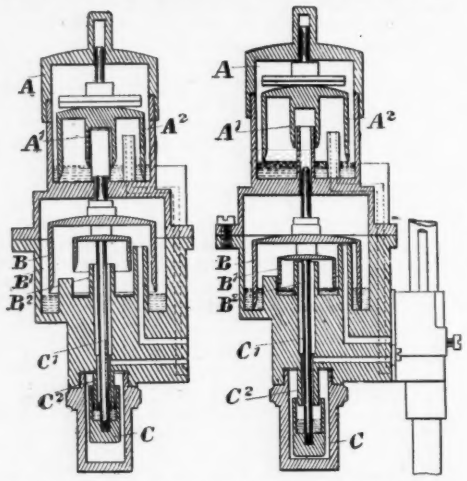
Actuating Lighting and Extinguishing Gas-Lights.

ROSIE, J., and M'KELVIE, J., of Edinburgh.

No. 4283; Feb. 22, 1909.

This invention relates to means for automatically lighting and putting out gas-lights by varying the pressure in the mains, and particularly to methods which include an illuminating and a pilot light. By it, any number of lighting waves may be sent in succession until all the lights are lighted, and the lights are put out by a wave of regulated higher pressure than that used for lighting.

The device employed is similar to that shown in patent No. 5793 of 1908, in which the lighting is effected by a pressure wave acting on a bell valve so as to admit the gas to the burner—the "lighting bell." In addition to the lighting bell, another bell—"the putting-out bell," is loaded to open on a determined higher pressure than the lighting bell. The opening of the putting-out bell admits the gas to the outside of the lighting bell, which is thereby balanced and falls by gravitation, cutting off the gas from the burner. A port from the chamber in which the lighting valve is placed connects with the pilot light and permits the exhaust of the gas pressure above atmospheric pressure.



Rosie and M'Kelvie's Lamp Lighter and Extinguisher.

The illustration shows a longitudinal section of the appliance, with the lighting bell open, and the putting-out bell open, respectively.

The chamber A (the "auxiliary chamber") has within it a central stand-pipe covered by bell A^1, upon which is formed the bell A^2 guided to have an up-and-down motion. The bell A^1 is arranged so as to lift clear of its seal, while the bell A^2 remains sealed. Also within the chamber A is a pipe with a port communicating with the gas-supply pipe—shown dotted. The central stand pipe in A communicates by a port with the central chamber; and the bell A^2 of the auxiliary chamber is so weighted that it takes more pressure of gas to lift this bell than it does to lift the bell which admits the gas to the burner-pipe.

Within the central chamber is the bell B supported by a vertical rod so guided as to have a rising and falling action, and having within it, and attached to it, a bell B^1. This bell lifts clear of its seal, while the bell B remains sealed; and the latter bell must be of such area that at normal pressure the gas will lift it. But the bell B^1 must be of such area that at normal pressure the gas will not lift it. Within the chamber is the central stand-pipe B^2, having a port communicating with the gas-supply pipe. The bottom of the central chamber is provided with another chamber, having within it a bell C supported by a rod C^1, employed for the purpose of effecting the lighting and extinguishing of the pilot light.

The action of the appliance is as follows: Gas entering through the main passes up the port of the stand-pipe B^2 inside the bell B^1. At normal pressure the gas does not lift the bell; but when a pressure wave is sent, the gas lifts both the bell B^1 and the bell B sufficiently far to clear its seal. The cup B^1, by reason of it being clear of its liquid seal, admits the gas to the bell B; the gas thence passing down to the burner-pipe. Owing to the larger area of the bell B, the normal pressure of the gas is sufficient to keep the valve open and admit gas to the burner. When the gas is admitted to the bell B^1, it is also admitted to the bell A^2; but it does not lift it, because A^2 is weighted so that it takes more pressure of gas to lift it than it does to lift B^1.

The apparatus for actuating the pilot light consists of the cup C (with liquid seal) suspended from the bell B^1 by means of the rod C^1, and is so adjusted that when the bell B^1 is lifted clear of its seal the cup is closed into its seal, and *vice versâ*. The upper portion of the casing is formed with the depending tube C^2; and there is sufficient room for the gas to pass into the lowest chamber when the cup is lowered, and under the cup when it is lifted. From the lower chamber the gas passes to the pilot light.

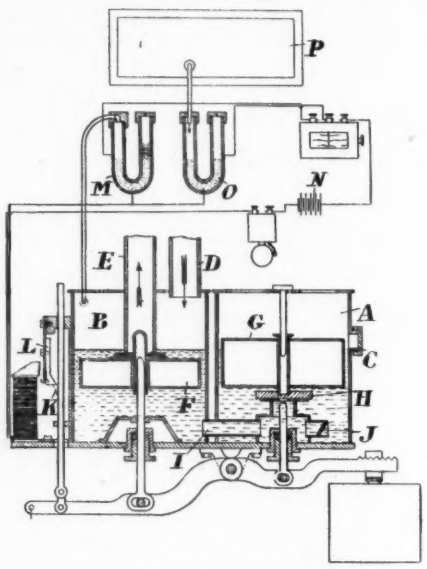
The pilot light being lifted and normal pressure being maintained in the mains, in order to light the lamps a wave is sent along the mains at a pressure capable of raising the bell B^1, but not of sufficient pressure to raise the bell A^2. When the bell B^1 is raised, the gas passes under the bell B and at the same time passes on to the burner. Owing to the area of the bell B, as has been explained, it is supported by the normal pressure of the gas, and does not fall when the pressure wave is withdrawn. At the same time, the cup C is lifted and the pilot light put out. In order to put out the lamps and relight the pilot-lights, a wave is sent along the main at a pressure sufficient to lift the bell A^2. This pressure wave lifts the bells A^1 and A^2 so that the former is clear of its seal. The pressure above and below the bells B and B^1 being thereby rendered equal, the bells fall by gravity and cut off the gas. At the same time, the cup C being lowered, the gas flows to the pilot-light.

Indicating and Stopping Leakage from Gas-Pipes.

SCHMIDT, L. & H., of Dusseldorf, Germany.

No. 5301; March 4, 1909.

This invention relates to apparatus by means of which, when the pressure in a gas-pipe is reduced and the flame consequently extinguished, or gas collects in a space so as to cause danger, the gas supply is shut off.



Schmidt's Gas-Leakage Indicator.

The apparatus as illustrated consists of two receptacles A B, capable of being filled with fluid up to the feed-pipe C and closed—B by an air-tight cover and A by a cover which allows air to pass through. In communication with B is a pipe D for the gas, and a pipe E through which the gas flows out again.

In B is a float F, with a central opening, which carries a valve; and the weight of the float and valve is so great that the float is immersed up to the top in the fluid. In A, a float G is provided, having a central opening through which runs a flanged pipe, to the lower end of which the weight H, acting as a valve, is fixed. The receptacles A and B are connected by a pipe I, opening freely into B, whereas it opens in A into a special chamber provided at the top with an open tubular extension, which can be closed by means of the valve H, and with a laterally projecting tube J, in which is a non-return valve, which opens towards the interior of the chamber. Passing through stuffing boxes in the bottoms of the two receptacles are pins, the lower ends of which are pivotally connected with a lever, which carries on one arm a weight, while to the other arm a rod, provided with a projection K, is pivotally connected. Above the projection a flexibly mounted arm L is arranged, and adjoining this is an electro-magnet.

The receptacle B communicates with a pipe M, which is bent U shape, and consists of non-conducting material, and is filled to a certain height with mercury. This pipe is conductively connected with a source of electric current N. In the vessel, above the mercury, is a contact-piece, connected through a conductor with the electro-magnet and the source of current. Adjoining the pipe M is a second pipe O (containing mercury) formed in the same manner as M, and connected with the electro-magnets and source of current. Into the pipe O a pipe runs which leads to a so-called diffusion chamber P made of porous material—for example, clay.

The action of the device is as follows: The gas flowing through the pipe D into the receptacle B has a tendency to force back a portion of the fluid corresponding to its pressure. The passage to the pipe E is, however, closed against this fluid through the valved float F, and the passage to the receptacle A shut off through the valves H and J. In order to set the device in operation, it is necessary to make the passage for the fluid to B free. For this purpose the arm of the main lever is pulled down so that the pin of the lever arm comes below the valve H and lifts it. The fluid can now pass into A and ascend, in connection wherewith the ascending float G holds the valve suspended. Under the influence of the gas entering through the pipe D the fluid now sinks in the receptacle B, so that the float F and its valve again open the outlet pipe E for the passage of the gas to the places where it is to be used. If the pressure of gas be now considerably reduced (or cease at all), the fluid flows back out of A to B until the valve H (which is so arranged that it closes the inlet pipe before the level of the fluid has reached the same height in both receptacles) shuts off the supply. The remainder of the fluid then flows only to B until equality of level is established. The float F ascends with the ascending fluid, and its valve lies again in front of the opening of the outlet pipe E and interrupts the passage of the gas until the main lever again raises the valve H.

In consequence of the reduction or the ceasing of the gas pressure, the mercury rises in the one arm of the pipe M, having been previously

forced downwards through the gas. When the mercury has risen as high as the contact and thereby closed the circuit, the arm L is attracted by the electro-magnet, and the rod that is locked by means of this arm is released. In consequence of this, the main lever arm is turned under the influence of its weight with the left part upwards, and presses the valve Z on to its seat; so that the pipe E is closed independently of the rising of the fluid in the receptacle B. At the same time the ringing mechanism is actuated, and danger signalled on the board through the dropping of a flap or the like.

If in the space in which the diffusion chamber P is arranged gas should collect—for example, in consequence of the breakage of a pipe or a cock being left open—the gas collecting in the chamber flows into the one arm of the pipe O and presses the mercury contained in it downwards, and in the other arm upwards. If, now, the mercury rises to the contact, the circuit is closed in the manner already described, the arm L is attracted and the valve closed, and the board and the bell mechanism actuated.

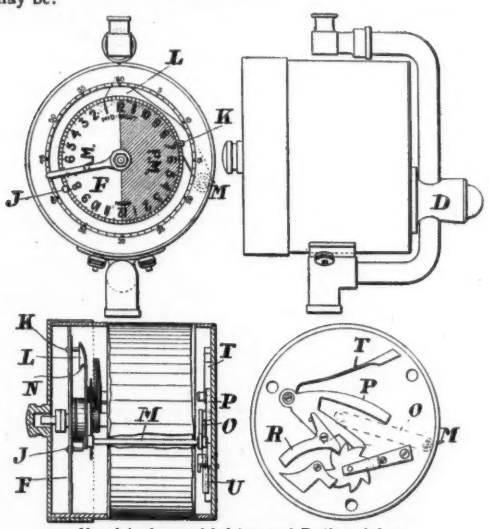
Controlling the Lighting and Extinguishing of Gas.

HARRIS, H. W., of St. John's, S.E.

No. 5997; March 12, 1909.

This is a modification of the apparatus described in patent No. 18,172 of 1908—being especially adapted for mechanically controlling, at predetermined times, the supply of gas to a street-lamp or a group of lamps.

In apparatus of the type referred to, it has heretofore been found difficult, the patentee states, to operate the valve controlling the supply of gas so that the gas is both turned "on" and "off" quickly; and it is the object of his present invention to provide means whereby this operation may be effected in an efficient and certain manner. He describes the present modification of his No. 18,172 of 1908 patent in connection with a well-known type of rotary disc-valve; the time mechanism, through its rotating dial and operating pins, imparting angular movement to a pair of levers in such manner as to raise into operative position a weighted or spring-controlled valve-operating lever adapted to co-act with the valve so as to impart angular or reciprocatory movement thereto (according to the type of valve employed), and so instantaneously to set the valve to the "on" or "off" position as the case may be.



Harris's Lamp Lighter and Extinguisher.

The operation of the device shown is as follows: When one of the operating pins J or K has travelled with the dial F during its angular movement until the pin engages the nose N of the resilient lever L, the continued angular movement of the dial causes the free extremity of the lever to be raised, and thereby imparts angular movement to its spindle M, and therefore also to the latch-lever O secured on it. During its upward or outward travel, this latch-lever encounters and raises one of the limbs of the spring-controlled bifurcated valve-operating lever P and raises it, at the same time disengaging the detent R and extremity S of the second limb of the lever P from the ratchet-wheel U, and raises the detent clear of the wheel and over the point of the next succeeding tooth on it.

While the movement of the latch-lever is in progress, the operating pin is passing over the nose at the head of the lever L, from which the pin suddenly becomes disengaged and enters the offset portion in the rear of the nose—thus permitting the lever to suddenly resume its normal position (by gravity or by spring pressure if required) and simultaneously removing the support of the lever O from the lever P, which latter, under the influence of the spring T, quickly resumes its normal position, and, by the engagement of the nose of the detent R with the next succeeding tooth on the ratchet-wheel U, imparts rapid angular movement to the ratchet-wheel U, and, consequently, also to the controlling valve contained in the valve chest D; the forward extremity S of the lower limb of the lever P preventing over-running of the ratchet-wheel. In this way, the controlling valve is instantaneously operated from the "off" to the "on" position, or *vice versa*.

In cases where the apparatus is employed in connection with burners which are provided with pilot lights, and it may not be expedient to operate the valve instantaneously, in order to render the operation more gradual, the lever O may be extended and connected to the lever P through intermediate multiplying levers, one of which may be weighted or spring-controlled so as to reduce the load on the time mechanism. By this arrangement not only is the controlling valve operated gradually (yet quickly), but the time mechanism is relieved of a considerable amount of work.

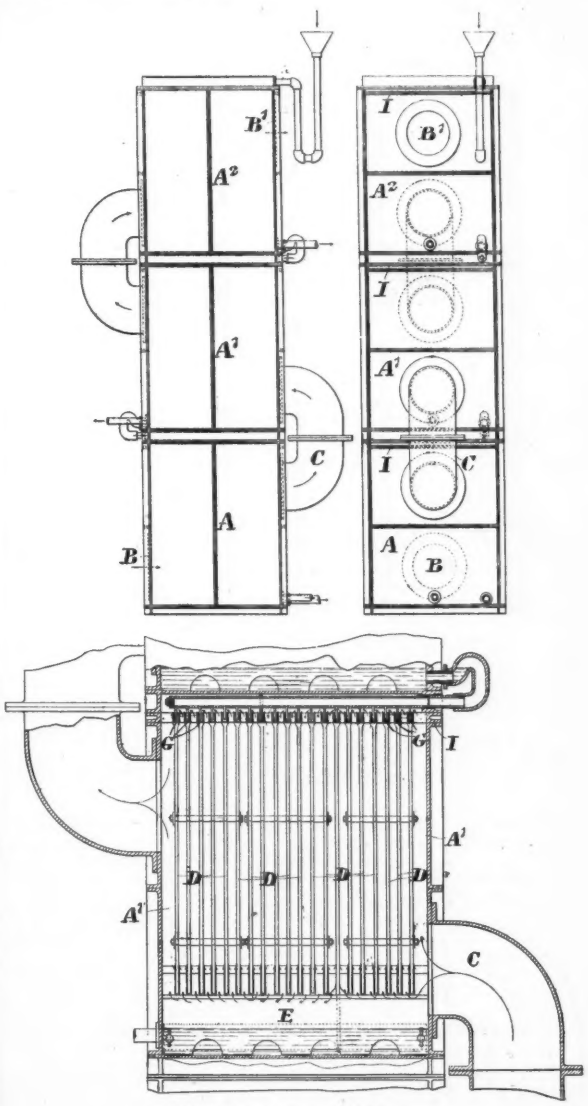
In cases where the apparatus controls a group of burners, and where it may be desired that the gas to one or to several shall be turned off before the remainder—say, one group at twelve p.m., and a second group at three a.m.—a third operating pin would be attached to the rotary dial F in the manner referred to in the 1908 patent, and the number of teeth on the ratchet-wheel U would be varied accordingly—say, from eight to six. The valve in this case would be so constructed as to regulate the supply of gas as desired at every sixth-of-a-revolution.

Cooling and Condensing Gases.

KIRKHAM, HULETT, AND CHANDLER, LIMITED, of Palace Chambers, Westminster, and BLAKE, E. W., of South Croydon.

No. 6557; March 18, 1909.

This invention relates to apparatus "for inducing a natural settlement of the heavy condensable vapours," wherein the gases to be treated pass with a slow movement in contact with a series of surfaces which are cooled with water on the inner or opposite faces to those with which the gases come into contact. The hollow cooling plates have troughs arranged at the upper end into which water is delivered from a duct, and from which it overflows down the inner faces of the plates, and the water escapes from the insides of the plates at their lower ends and falls into a tank. Above the tank are collecting plates arranged in conjunction with a channel, in which collect the products condensed upon, and which drip from, the exterior surfaces of the cooling plates. The several plates are preferably connected together in groups; and baffles are arranged for compelling the gases to traverse the plates of each group in the direction of their length.



A "Standard" Cooler and Condenser.

The illustration shows elevations (at right angles to each other) of an apparatus provided with three condensing chambers or compartments arranged one above the other, and a section of one of the chambers.

A, A^1, and A^2 are the three compartments of which the apparatus is composed; the gas being introduced into the lower compartment through B, whence it flows into the middle compartment through the pipe C, and thence into the upper compartment through the pipe C^1—the gas escaping from the upper part of the compartment through B^1.

Each compartment has arranged in it a series of hollow plates D, each with two walls formed of plates either plain or corrugated. In the drawing the two walls are shown as being formed of a single plate folded in the centre of its length, so that the space between the two faces is closed at the bottom, while the edges which form the upper edge of the folded plate are bent outwards to increase the width of the plates. These hollow plates at their lower ends rest upon supporting bars E, arranged in the bottom of the chamber and forming a tank for collecting the cooling water which passes through the hollow plates and escapes through the open sides. The several plates are preferably fixed together in groups by ordinary bolts, with distance-pieces between each pair of plates; so that they can be readily withdrawn from the apparatus for cleaning purposes. At the upper end of each plate is arranged a trough G, into which water can be delivered through a duct provided with a series of branch pipes dipping into the several troughs; the water flowing into the troughs and then overflowing and passing down between the troughs and the inner surfaces of the hollow plates, "whereby the latter are cooled—the water escaping at the lower end of the plates into the base of the compartment."

In constructing the apparatus, the troughs G are formed upon, or carried by, a frame I, which can be lifted bodily away from the plates, together with the troughs, when the cover of the chamber is removed. One of the division plates D (or more than one, if desired) is extended so that it will dip into the water in the bottom of the chamber, and the cover of the chamber is provided with a rib which depends into one of the water troughs and forms a baffle; so that the gas will be caused to flow through the plates in alternately opposite directions. The gas flows in the direction of the arrows; a plate compelling the gases which enter through the pipe C to move upwards between one series of plates, and a baffle compelling it to move downwards between the next series of plates, when it again passes in an upward direction through the third series of plates to the outlet pipe.

In the bottom of the chamber is arranged a collecting channel, on the edge of which a series of plates rest at one edge; the plates also resting at the other edge upon the bars E. These plates serve for collecting the products which are condensed out of the gases during the time they are travelling over the condensing area; the collecting channel acting as a conductor for taking the products to a seal-pipe outside the apparatus.

Vertical Coal-Gas Retorts.

WILSON, A., of Glasgow.

No. 6449; March 18, 1909.

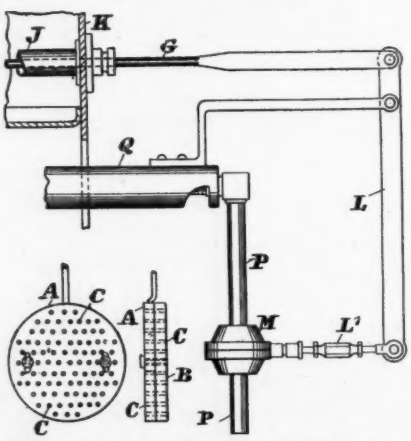
This invention relates to improved means for working vertical coal-gas retorts wherein a quantity of fuel is charged into the top of the retort and a measured quantity of coke withdrawn from the bottom of the retort, at regular intervals, whereby the discharge of coke from the retort is regulated. With these means for working a vertical coal-gas retort a better quality of coke is said to be produced and the working cost is greatly reduced. An illustrated description of the arrangement appears on p. 166 of to-day's issue of the "JOURNAL."

Regulating the Supply of Gas.

FLETCHER, RUSSELL, AND COMPANY, LIMITED, NEIL, A., and FLETCHER, T. W., of Warrington.

No. 6911; March 23, 1909.

This invention relates to disc valves such as are employed for regulating the supply of gas in apparatus where the gas-flame is reduced or increased by the automatic action of disc valves.



Fletcher, Russell, and Co.'s Gas-Stove Regulator.

The illustration shows a face view, and an edge view (enlarged) of discs forming the feature of the invention, and the application of the discs.

There are two discs, A and B, in which rows of small holes C are formed in the same positions in each disc; so that when one disc is placed over the other with the holes in both discs in the same or open position, a clear passage equal to the area in cross section of the supply tube through both discs is obtained. The discs are connected by studs passed through slots in them, so that by sliding them over each other the holes are partially or wholly covered.

The adaptation of the invention will be governed by the apparatus to which it is required to be applied. If it is employed in combination with a rod as G—*i.e.*, passed through a tube J in a vessel K containing water heated by gas—when the water reaches a certain temperature and heats the rod, causing the length of it to be increased, a lever L, which is pivotally connected to a bracket fitted on the gas-burner Q and at one end to the rod G and the opposite end of the lever L to the adjustable rod L^1—that is, connected to the disc A, which, with the disc B, is enclosed in a casing as M on the gas-inlet tube P—the disc A will be moved so as to close the holes by the rod G extending and operating the levers L and L^1 connected with the disc, and shutting off the gas, with the exception of a pilot light, by sliding one of the discs over the other in the case M, thereby wholly or partially covering the apertures therein and preventing the gas from the inlet pipe P passing through. When the water cools and the rod G contracts, the holes C will revert to their open position, and the gas will be ignited by the pilot light.

Gas-Regulators.

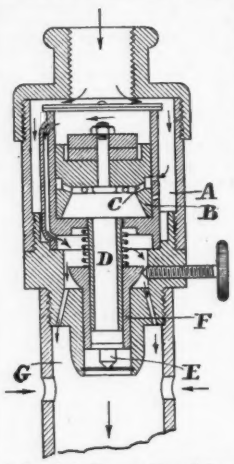
EHRICH AND GRAETZ, of Berlin.

No. 7399; March 27, 1909. Date claimed under International Convention, April 3, 1908.

This invention relates to gas-regulators by means of which it is possible to "automatically control gas pressure so that changes of pressure in the gas-mains do not affect the burner or interfere with its normal efficient working."

The form illustrated represents a burner-tube in cross section with a regulator (also in cross section) arranged in it.

Gas enters the tube by the opening at top; and within the tube is a casing provided with ports, which lead from the annular space A to the interior. The casing is circular in form, and a regulating device B is arranged therein, in the form of a piston movable within the cylinder. The piston has a groove in it which, in the normal position (illustrated), leaves the ports in the casing open. From the groove there lead ports C to the under side of the piston. The gas passing through these ports to the under side of the piston flows through the tubes D to the burner nozzle, which is adapted to be regulated by a pin E attached to a cross-piece carried by the tube F, which is slidable over the tube D, and is provided at its upper end with a head. A screw is adapted to engage the head so as to move the tube F and pin E upwards against the action of a spring. From the upper end of the casing above the piston B there leads a conduit to the space below the casing, which is further connected to the mixing-tube G of the burner by a conduit.



A Graetzin Burner Regulator.

It will be seen that the upper end of the casing above the piston B is in this way connected to a point of lower pressure than that which exists below the piston B and within the tube D. This difference in pressure is the pressure required to press gas through the burner-nozzle. In order to get efficient automatic control, the pressure difference on opposite sides of the nozzle should remain constant. If the pressure exceeds a certain required amount the piston rises; so that the lower wall of the groove partly covers the ports in the casing.

APPLICATIONS FOR LETTERS PATENT.

8034.—ROOFF, E. P., "Air gas production." April 4.
8174.—BENNINGHOFF, C., and KLÖNNE, A., "Gas-fired ovens." April 5.
8178.—SLICK, E. E., "Producing gas." April 5.
8223.—NOAD, A. C., "Gas-burners." April 5.
8244.—JEFFERY, F. W. J., "Gas-economizer." April 6.
8250.—GADD, W., "Spirally-guided and spirally-supported gasholders." April 6.
8254.—RICHMOND GAS STOVE AND METER COMPANY, RANSOME, J. A., and SHERBURN, W. H., "Gas fires or stoves." April 6.
8307.—DRUMGOLD, C. T., "Boxes for mantles." April 6.
8320.—KENT, W. G., and HODGSON, J. L., "Fluid meters." April 6.
8328.—BOWLEY, J. W., "Measuring the flow of liquids." April 6.
8367.—DUTTON, F. & C., "Safety gas extinguisher." April 7.
8369.—BENNINGHOFF, O., and KLÖNNE, A., "Supporting furnaces for the manufacture of gas." April 7.
8379.—LLOYD, E., and SIMON-CARVES BYE-PRODUCT COKE-OVEN CONSTRUCTION AND WORKING COMPANY, LTD., "Treatment of coke-oven and like gases." April 7.
8396.—ROTHERHAM, K., and JOHNSON, W., "Stopcocks." April 7.
8404.—ORNSTEIN, I. R., RATZERSDORFER, F., DEUTSCH, S., STERN, C., and ORNSTEIN, M., "Artificial fuel for heating and lighting purposes." April 7.
8436.—AUBERT, A. M. & J. M., "Distance kindling and extinction of gas-lamps." April 7.
8474.—HARRISON, R., and MELMORE, W. M., "Compressing air or gas." April 8.
8512.—WATTS, C. J., "Mantles." April 8.
8521.—IONIDES, A. C., JUN., "Air-gas apparatus." April 8.
8525.—GLOVER, T., "Dry meters." April 8.
8526.—GLOVER, T., "Radiators." April 8.
8543.—WRIGHT, H. F., "Spirally-guided gasholders." April 8.
8544.—WRIGHT, H. F., "Gasholders." April 8.
8557.—SCHWABACHER, H., "Gas-lighter." April 8.
8564.—YATES, H. J., "Gas-fires." April 8.
8596.—COWAN, R., "Gas-heaters." April 9.
8654.—LENNOX, A. B., "Spraying water in flues or chimneys for washing smoke or other gases." April 9.

LEGAL INTELLIGENCE.

WATER SUPPLY TO A "SEPARATE" TENEMENT.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Tuesday, April 12.

(*Before Justices* DARLING *and* BUCKNILL.)

Metropolitan Water Board v. G. P. & J. Baker, Limited.

This was an appeal by the plaintiffs from the decision of his Honour Deputy Judge Lush, sitting at the Westminster County Court, in an action brought to recover five quarters' water-rate; and it raised an important question of law on the construction of section 8 of the Metropolitan Water Board (Charges) Act, 1907.

Defendants carry on business as carpet manufacturers in two blocks of buildings in Warwick Square, E.C., and one block in Newgate Street; there being intercommunication between the whole of the premises. For many years water was supplied to only one block—No. 9, Warwick Square—which was separately rated at about £100 per annum; but now that the premises were connected, the plaintiffs sought to charge upon the whole assessment, on the ground that the buildings were occupied as a "separate" tenement. Section 8 of the Act provided that the Water Board shall, at the request of any occupier or owner of any house or building, or part of a house or building, occupied as a separate tenement, furnish a sufficient supply of water for domestic purposes at a rate not exceeding 5 per cent. on the rateable value. The learned County Court Judge held that the actual fittings were confined to one house (No. 9), and that the charge could be levied upon that only.

Mr. A. B. SHAW, for the plaintiffs, argued that when several rooms were converted into one tenement this was the house or building in respect of which the supply was required, and that the rate must be levied on the whole.

Mr. DRUCQUER, for the defendants, contended that the Judge in the Court below was justified in finding as a fact that the water was only furnished to No. 9, as it was proved that the other premises were supplied with water from a well.

Justice DARLING, in giving judgment, said the question to be determined was whether a certain building was occupied as a separate tenement in respect of which the supply was required, or whether No. 9, into which the pipe went which gave the supply, was occupied as a separate tenement apart from the rest of the building. That No. 9 was once a separate tenement was beyond dispute. Communication had been made between it and the other houses; but the fact that there was a doorway leading from it into the next house, and from that into the adjoining one, did not necessarily make the whole a house or building occupied as a separate tenement. The question was really one of fact; and it was quite possible that upon certain facts the County Court Judge ought to find that two houses which had been thrown into one had ceased to be separate tenements. But here there was a finding of fact that No. 9 was a separate tenement; and with that finding he was not prepared to differ.

Justice BUCKNILL agreed, though with some hesitation.

The appeal was dismissed, with costs; but leave to appeal further was given.

Manufacture of Sulphuric Acid—Patent Litigation.

An action in which we have a slight interest, and which had been at proof before Lord Salvesen in the Court of Session for ten days, reached its termination on Tuesday of last week. The pursuers, the Badishe Anilin und Soda Fabrik, of Ludwigshafen-on-Rhine, are the owners of five patents for processes used in the manufacture of sulphuric acid. In the process sulphuric anhydride was formed by bringing gases purified from arsenic, phosphorous, and mercury into contact with platinum. It was averred by the pursuers that defenders, Nobel's Explosives Company, Limited, of Glasgow, were infringing the patents in their works at Ardeer, in Ayrshire. This was denied by the defenders, who maintained that the pursuers' patents were anticipated by prior use at Silvertown, near London. The proof disclosed, in the course of the examination of the defenders' first witness, that at Ardeer the gas was preferably used unpurified. Counsel for the pursuers stated last Tuesday morning that they were satisfied that they could not succeed on the purification part of their patent, and that as this was an exceptionally important part of their case, they had to abandon it. This was allowed by the Court; and the pursuers were found liable in expenses.

A Hairdresser's Water-Rate.

At the West Ham Police Court, last Wednesday, before Mr. Gillespie, Richard Hall, hairdresser, of Windmill Lane, Stratford, appeared to an adjourned summons by the Metropolitan Water Board for 1s., their assessment of a quarter's water-rate due. Defendant disputed his liability. Mr. D. Collins, the Assistant-Solicitor to the Metropolitan Water Board, called several witnesses to prove that numbers of barbers in West Ham paid for water for trade purposes, and that a former occupier of Mr. Hall's shop had paid 5s. a year for the water he used in his hairdressing business. An inspector of the Board said that on the previous Monday he saw the defendant's rain-water tank. It was 32 in. by 16 in. and 15 in. deep, and would hold about 25 gallons. The day he went he found 12 inches of water in the tank, and he took from it about a pint of water. The defendant said that in addition to using the tank he collected rain water in baths, and put it in bottles and other receptacles. Mr. George Kebbell submitted some points of law, and argued that water for other than domestic purposes could only be supplied by meter and under contract. His Worship said defendant had a misapprehension of his legal rights, and he should make an order for the rate of 1s. per quarter. Defendant was ordered to pay £1 1s. solicitor's fee, and 5s. 6d. Court costs.

Falsifying Accounts of the Metropolitan Water Board.

At the Surrey Sessions a few days ago, before Sir Charles Walpole and other Justices, Edward Sproson Alderton (51), engineer's clerk at the Surbiton works of the Metropolitan Water Board, was indicted for falsifying the accounts of the Board, and obtaining by means of false pretences sums of £2 10s., £5, £3, and £3 respectively, with intent to defraud. A further indictment was preferred for having on July 3 last obtained from Mr. Hugh Wrinch, the Resident Engineer, the sum of £24 11s. 6d., with intent to defraud. Mr. E. A. Jelf prosecuted; Mr. H. Lynn defended the prisoner. Mr. Jelf outlined the case in his opening address, and said the Water Board did not wish in any way to press the charge; but, being a public body, they thought it a duty to lay the facts before the Jury. If there was any satisfactory explanation on behalf of the prisoner, the Board would be only too happy to see him acquitted, as he was an old servant to them and to their predecessors. At the close of the hearing, which included evidence by the prisoner himself, the Jury returned a verdict of "Guilty." The Chairman said the prisoner had been found guilty of the offence of falsifying the accounts of the Water Board; and, after the evidence, he did not see how the Jury could have come to any other conclusion. It was a very serious offence, for which he might have been sent to penal servitude for seven years. They had heard a strong appeal on behalf of the prisoner, not only from his own Counsel but from the Counsel representing his employers, who were anxious, under the circumstances, that he should be dealt with in as lenient a manner as possible. It had been pointed out that he had lost his employment, his character, and his pension and other advantages through what he had done, and that it would be difficult for him in future to earn his own living. The fact that he had been found guilty of this offence was far more serious to him than such a verdict would be in the case of many men. The Court had taken all this into consideration, and had come to the conclusion that they might venture to follow a course that would give the prisoner another chance of regaining an honest name. They would bind him over in the sum of £100 to come up for judgment if called upon. This meant that he might go free; but he must remember that if at any time he misbehaved himself, he would be called upon to come up and receive sentence for the present offence.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: East Grinstead Gas and Water Bill.

Bill read a second time and committed: Brighton and Hove Gas Bill.

Bills reported, with amendments: Gas Companies Standard Burner (No. 1) Bill, Gas Companies Standard Burner (No. 2) Bill, Gas Companies Standard Burner (No. 3) Bill, Garnant Gas Bill, Matlock Bath and Scarthin Nick Urban District Council Bill, South Lincolnshire Water Bill, Thorne and District Water Bill.

The Earl of Camperdown has replaced Lord Gorell as a member and as Chairman of the Select Committee on the Aberdeen Corporation Water Bill.

The Water Supplies Protection Bill has been referred to a Joint Committee of the two Houses, consisting of the Earl of Liverpool, the Earl of Verulam, Lord Clinton, Lord Desborough, Lord MacDonnell, Lord Henry Cavendish-Bentinck, Sir William Crossley, Sir John Rolleston, Mr. Holt, and Mr. H. Lewis; to commence sitting to-day.

Petitions against the Brighton and Hove Gas Bill have been presented by the Brighton and Hove Corporations, and by the East and West Sussex County Councils.

The opposition to the Havant Gas Bill has been withdrawn.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read a second time and committed: Bishop's Stortford, Harlow, and Epping Gas and Electricity Bill, Southend Water Bill.

Bills reported, with amendments: Glasgow Gas Consolidation Bill, Tipperary Gas Bill [parties do not proceed], Wicklow Gas Bill, Worksop Urban District Council Bill.

Bill read the third time and passed: Pontypridd Water Bill.

The Fylde Water Board Bill, Mountain Ash Water Bill, Pontypridd and Rhondda Joint Water Board Bill, Southend Water Bill, and Staffordshire Potteries Water Bill have been referred to a Select Committee, consisting of Sir Luke White (Chairman), Mr. Worthington-Evans, Mr. Mills, and Mr. Barton; to sit on Thursday next.

Petitions against the Southend Water Bill [Lords] have been presented by the Southend Corporation and the Leigh-on-Sea Urban District Council; and one against the Staffordshire Potteries Water Bill, by the Stoke-upon-Trent Corporation.

The petitions presented against the following Bills have been withdrawn: Bristol Gas Bill, by the Bristol Corporation; Slough Water Bill, by the Conservators of the River Thames, the Buckinghamshire County Council, and the Rickmansworth and Uxbridge Valley Water Company.

Mr. Wardle (Stockport) put a notice on the paper last Friday of his intention to move, at the time of private business yesterday—"That it be an instruction to the Committee on the Bishop's Stortford, Harlow, and Epping Gas and Electricity Bill to insert a clause limiting the interest on capital, and directing that the profits in excess of such interest shall be applied to a reduction in the price of gas and electricity." Mr. Hudson (Newcastle-on-Tyne) will also move that the Committee be instructed to omit clause 84 of the Bill, relating to the laying of mains for the supply of electricity in certain streets.

GAS COMPANIES (STANDARD BURNER) (No. 1) BILL.

House of Lords Committee.—Monday, April 11.

(*Before Lord* RITCHIE, *Chairman*, *Lord* WILLOUGHBY DE BROKE, *Lord* TEMPLEMORE, *Lord* SANDYS, *and Lord* VIVIAN.)

Mr. J. D. FITZGERALD, K.C., Mr. HONORATUS LLOYD, K.C., Mr. HUTCHINSON, and Mr. A. M. PADDON appeared for the promoters. Various local authorities, who were petitioners in opposition, were represented by Mr. RAM, K.C., Mr. J. G. TALBOT, K.C., and Mr. COURTHOPE MUNROE.

As briefly reported in the "JOURNAL" last Tuesday (p. 121), their Lordships concluded the consideration of the above-named Bill on the previous day, and passed the preamble. The following is an extended report of the day's proceedings.

Mr. TALBOT, in addressing the Committee in support of the case of the Mersey Docks and Harbour Board, explained that the Board were very large consumers of gas both by themselves and by their tenants (a great variety of industrial undertakings), for the purposes of lighting, heating, and power. So far as concerned the supply given to them by the Liverpool Gas Company, they opposed the Bill altogether. There was no case to be made for altering the existing state of things. Before the promotion of the Bill, which, it could not be denied, affected the Board in the very serious way, the Gas Company did not consult either the Board or the Corporation. The Act of Parliament under which the Board obtained their supply specified that the Company were bound to provide gas tested with a burner which gave a flame of 20-candle power; and the result of what they were proposing by the Bill would be to enable them to supply gas of less value than that to which they were entitled. No one suggested that it was the same gas. If they had come to Parliament and asked to reduce the illuminating power of their gas to 15 candles, there was no question whatever that they would have had to offer some *quid pro quo*. All the London Gas Companies had had to reduce their standard price. As to the Liverpool Company being a maximum-price Company—their maximum price being 4s. 6d. and their selling price 2s. 6d. per 1000 cubic feet—it was quite obvious that no compensation in money could be applied in lieu of the reduction of illuminating power. Supposing the Company gave the whole of the saving to the consumers, it would not go anywhere near compensating them, particularly the flat-flame consumers, for the loss which they undoubtedly would sustain. The evidence showed that the saving to the Company would be 3·85d.; but the loss to the flat-flame consumers would be 7½d. The burner now in use was perfectly satisfactory for their purposes. What case, therefore, was there for making any alteration whatever?

The following evidence was then given for the Board.

Mr. *A. G. Lyster*, the Chief Engineer to the Board, said the amount paid by them for gas was over £28,000 per annum—£23,000 for lighting and £5400 for power. The flat-flame burners used numbered 17,000. If the Bill were allowed to pass, the gas supplied would be of an inferior quality, both for heating and power; and if the price remained unaltered, he thought they might have to pay £3000 or £4000 more for their gas, though it was difficult to arrive at an exact figure. In the past six or seven years, they had spent £5710 in improving the lighting; and existing arrangements would have to be entirely readjusted, because they would have to consume a great deal more gas. In order to get the same efficiency, they would have to alter their burners or introduce more lamps. In connection with the undertaking of the Board, there were two sets of large pumping-engines which were driven by gas-engines of from 500 to 600 H.P.; and they had had expert opinion of what would have to be done with these engines in order to make them capable of fulfilling their work. If the inferior gas as proposed under the Bill was supplied through the engines as they stood, they would fail entirely to do their duty. Therefore it would mean an alteration of the valves, pipes, &c., in order to allow a larger volume of gas to go into the cylinders; and it had been roughly estimated that the cost involved would be £1000, or even more.

Replying to Mr. HUTCHINSON, witness agreed that if the Board were to lose £3000 a year because of the proposals in the Bill, the Gas Company might get it; but he did not agree that any additional revenue received by the Company would go to the consumers in the reduction of the price of gas.

Mr. HUTCHINSON pointed out that the Cardiff Dock Company carried on a system similar to that of the Mersey Docks and Harbour Board, and they did not complain.

The CHAIRMAN asked what the change in the burner was in that case.

Mr. HUTCHINSON replied that it was from the No. 1 to the No. 2 burner. With the former, they used 16-candle gas; with the latter, 14-candle gas.

Mr. *Richard Holt* said it was of the highest importance to keep down the cost of working the docks, because a very small thing would determine the success or failure of an undertaking such as that of the Board. It was looked upon as the best-lighted dock in England; but this was largely due to the fact that they had 20-candle gas. As a matter of business, if the Gas Company wanted an alteration in the illuminating power, they should have gone to the Board and discussed the matter with them.

Replying to Mr. HUTCHINSON, witness said the annual income of the Board was from £1,250,000 to £1,500,000; and the extra payment of £3000 was a matter of considerable importance to them.

Mr. RAM, who did not call any evidence, then addressed the Committee. He said it was not denied that the new burner would give advantages to the companies. It would enable them to supply gas of lower quality, by which they would save money, as they would give an article that was not so good for heating and lighting. If the saving was to the extent of 1d. per candle, it would amount to £100,000 per annum. Apart from the question of whether the burner was good or bad in itself, to apply it to a varying number of companies where the circumstances were different, would be a gross injustice. The gas companies had attempted to make the answer that, though the consumer got less illuminating power, it was not proposed to alter the price or to confer any corresponding benefit, because he would get an advantage by reason of the companies producing more cheaply. But unless the consumer were protected, he would get no benefit at all; for there were many ways of diverting the money that would be saved—so many channels for conveying it into the pockets of the shareholders. On behalf of the consumers, the local authorities had very carefully considered the matter; and he asked the Committee to reject the Bill. But he also ventured to make a suggestion, which was embodied in the following clause, which he asked the Committee to accept:

(1) The provisions of this Act shall, as regards each of the promoting companies (in this section called "the company") come into operation on such date as shall be prescribed in each case by Order of the Board of Trade; and each such Order shall provide for such an increase in the statutory candle power of the gas supplied by the company as the Metropolitan Gas Referees may determine to be such as will secure that the actual amount of illumination per 1000 cubic feet to be afforded by the gas supplied by the company shall not be less than the actual amount of illumination required to be afforded per 1000 cubic feet by the gas supplied by the company immediately before the passing of this Act: Provided that the local authority or authorities concerned and the company may agree upon any other terms in lieu of the increase of statutory candle power provided for by this section.

(2) The provisions of this section as regards increase of statutory candle power and agreement upon any other terms in lieu thereof shall also apply in the event of the Board of Trade approving of any other burner, photometer, or standard light under the section of this Act of which the marginal note is "Testing Quality."

While submitting the clause, he asked that the Bill should be rejected absolutely. If the clause were accepted, it would, of course, mean a great deal of inquiry, and a considerable amount of time would have to be spent on the matter all over the country.

Mr. HONORATUS LLOYD then replied on behalf of the promoters. He said that the more he looked at this question the more convinced he was that the matter was really very largely one of argument. The evidence was, of course, necessary, in order to place before the Committee the details of the proposal; but, when all was said and done, it appeared to him to come back to this: What was the parliamentary bargain made between the various gas companies and their consumers when powers and obligations were placed upon them to supply gas? Were they by the Bill seeking to disturb that bargain, or was it, on the other hand, their opponents who had misapprehended the nature of the bargain? The promoters were merely seeking to put on the proper lines and make clear that that which was the intention of Parliament should be carried out; while the opponents had taken advantage of the occasion to ask for something to be given to them which Parliament never intended. It was perfectly obvious that Parliament said: "You shall supply, in return for the price and on the financial basis we lay down, a commodity which is equivalent to *x* candles;" and it was now suggested that when Parliament said, "You shall supply 16 candles," it did not mean 16 candles, but some varying light which might or might not be equivalent to 16 candles, and which depended upon the prescribed method of testing. It was idle to suggest that Parliament intended 16 candles in Manchester to mean something less than 16 candles in London. Parliament prescribed a light equivalent to the light of so many candles. That was the practice; and it was now crystallized by the Model Bill for testing the illuminating power of the gas—the burners to be used being the "Metropolitan" argand No. 2; or the Board of Trade might, on the application of a company or a local authority, approve the use of any other burner. From beginning to end it had been the intention of Parliament to prescribe that the commodity that should be supplied to the public was to be of so many candle power, and that this was to be fairly and accurately ascertained. Since the Model Bill was drafted, it had been the practice of Parliament and the Board of Trade to apply this clause of it; and the result was that there were numbers of gas companies now under the statutory provision that they were to supply gas of an illuminating power equivalent to so many candles, which was to be measured in the approved way. The position was that a burner was adopted very generally which was supposed to do that which Parliament intended should be done—viz., accurately test the illuminating power of the gas; and this burner was admirably adapted for 16-candle gas. Unfortunately, people rushed at it, and said: "Give us this new burner;" and it was applied indiscriminately—in some cases without, and in others with, the option of whatever other burner might hereafter be discovered. In the seventies, Mr. Charles Hunt found that the No. 1 burner, supposed to be so admirable for all purposes, though very good for 16-candle gas, was inaccurate and unreliable for other qualities; and eventually Dr. Vernon Harcourt publicly said the same, and it was generally admitted. This meant that though up to that time and afterwards, notwithstanding that Parliament had intended them to proceed upon the terms, financial or otherwise, they had laid down in the various companies' Acts, upon the basis of the standard prices upon which the capital had been subscribed, the companies had, by reason of the fact of the adoption of a faulty burner, been called upon to supply an article which had been untruly and inaccurately measured. The result was that this had been against the gas industry until modern times, when the No. 2 testing burner was invented. As a lower-grade gas became the commodity which the public required (and this, of course, was emphasized very largely by the introduction of incandescent lighting), it had been gradually realized by all, and was now admitted, that the No. 1 burner did an injustice to the purveyors of gas. Speaking for the public, he said the result was that, in order to appear to supply what Parliament had intended, the companies had to provide gas of a higher quality, because, in passing the test, defects were admittedly exaggerated; and therefore, unless gas of a higher quality was supplied to the burner, the result was that they did not get the statutory test they were bound to have. This meant that, to some extent, unnecessary expense had to be incurred by a company in order to produce an article which nobody intended should be manufactured. Speaking for the companies as well as for the public, he said this result was brought about at the cost of both purveyor and consumer. It was not in the interests of the consumer that a gas should be manufactured which was of a higher quality than he wanted—higher than he was entitled to by Parliament, and at a cost which was greater; and it was not fair

to the company that they should have to spend money in providing a gas which nobody intended should be supplied. The result was that the inaccurate burner tended to keep up the price of gas. A Departmental Committee inquired into the matter; and the Act of 1905 was passed, which provided that "the Gas Referees shall from time to time prescribe the burner for testing the illuminating power of the gas supplied by the company, and the chimney, if any, to be used with such burner. The burner so prescribed shall be of such a pattern, not being an incandescent or similar burner, as shall be practicable for use by the consumer; and the burner and chimney, if any, shall be the most suitable for obtaining, and in making the test shall be so used as to obtain, from the gas, when consumed at the rate of 5 cubic feet per hour, the greatest amount of light." He emphasized the words "from time to time prescribe." What was the use of its being said that, when Parliament said 15 or 16 candle power, it did not mean 15 or 16 candle power measured accurately, but measured in some particular artificial way, when Parliament had shown what their intention was, and had recognized that the burner which had been prescribed had been so ineffective and so irregular that they found it to be their duty to say, in effect, that the best burner the Referees should "from time to time prescribe" should be used? The candle power was to remain constant, the financial terms upon which the company's capital had been raised were to remain constant, but the testing-burner was to be variable "from time to time." Then, forsooth, these people who were appearing against the Bill said: "Now that we know the burner was inaccurate, that we have an accurate burner, and that there may be still more accurate burners, this is the time when Parliament should, and ought to, disturb the financial basis upon which a company has been established." Why was it now to be said, because the companies were seeking to get rid of an inaccuracy, were seeking relief from a burden which both the purveyor and the consumer had in common borne, that the whole of the relief obtained was to be taken by the consumer? Mr. Newbigging had admirably summed up the case in one of his answers. He was asked: "Since 1860, the gas purveyors, local authorities or companies, have had unnecessarily to go to the expense of manufacturing an article higher in value in order to produce the value which was intended." And his answer was: "Yes; for some gases." He (Mr. Lloyd) would challenge anybody to tell him, if the financial basis of any of those companies was altered upon the footing of the No. 2 burner being adopted, how the company were going to be dealt with in the event of any better burner being prescribed. It was to be said, according to the clause submitted to the Committee, that for the future the Board of Trade were to make inquiries, and were to be in the position of dealing, not only with the question of a better burner, but were to go into the question of the financial basis of the company; and in each case the company were to be liable to have their standard or maximum price altered. It was an end to investment of this sort. Under conditions such as these, who was going to invest money and pay large premiums under the auction clauses of modern Gas Acts? The consumers enjoyed the fact to-day that in sliding-scale companies enormous premiums were paid because the stability of the whole concern was the standard price as fixed by Parliament; and yet it was asked that this should be dealt with as a sort of movable feast. They had not taken the exaggerated view of the opposition, but they acknowledged that there would be some saving; and they agreed that it would vary according to the grade of gas, and in some degree according to the constituent parts of the gas. If the Committee were going to give him only the relief he asked, to the extent of only making him do what was intended when the standard price was fixed, there was no occasion to alter the thing at all. The whole policy of Parliament had been to legislate for people whom they presumed to be honest; and when they were dealing with gas companies, they made this presumption. In the Gas-Works Clauses Act, there was ample provision in regard to the application of profits; and in a maximum-price company, such as that at Liverpool, when maximum dividends were paid, they could not possibly put another farthing into the pockets of the shareholders. With regard to a sliding-scale company with a standard price, it had been told to their Lordships that the result of giving the promoters the relief they asked for would be that the consumer would get, by reduction of the actual price, from four-fifths to five-sixths of the benefit. This was the automatic effect produced by the sliding-scale itself; and it was what Parliament intended. If the relief were given, it would at once automatically apply to both shareholders and consumers—the latter getting a very large "lion's share." Parliament intended that a company should supply a gas which was reasonably free from impurities; and in the olden days, and until comparatively recently, it was necessary to go through a certain process with the view of getting rid of the sulphur compounds in the gas. Considerable expense was incurred in performing this operation. As time went on, it became obvious to everybody, and it was universally accepted, that an unnecessary outlay had been incurred, and that, so long as the sulphuretted hydrogen was taken out of the gas, there was no necessity for going to the expense of removing the sulphur compounds. This being the case, the gas companies went in a body to Parliament and submitted that they ought to be relieved from this incubus; and Parliament relieved them. Nobody suggested then that there was ground for interfering with the financial basis of the companies. Now it was said—and this was looking at the same question from another standpoint—that the existing fittings were unsuitable for use with the gas proposed. Evidence from this point of view had been given from Liverpool, because this happened to be a unique case. The figures given by Mr. Newbigging were totally at variance with those of the promoters. Mr. Newbigging had said with regard to incandescent lighting that there would be a loss of 10 per cent., and that 1100 cubic feet of gas would have to be consumed for the future in order to perform the work hitherto done by 1000 cubic feet. He also said the saving would be 3·85d. per 1000 cubic feet. If these figures were accurate, the result would be that the gentleman who for incandescent lighting to-day took 1000 cubic feet of gas at 2s. 6d. would for the future take 1100 cubic feet at 2s. 2·15d.; and he would therefore pay 2s. 4¾d. to produce the same result that to-day was produced for 2s. 6d. This was Mr. Newbigging's evidence; but he (Mr. Lloyd) did not accept it. It might be true that, with flat-flame burners and gas of high illuminating power such as there was at Liverpool, they did not get the same result with the low-grade gas; but they would require to burn more gas or to adapt their burner. With regard to gas-engines—and this was very remarkable—his learned friend had discovered, at a late stage in the case, that some slight inaccuracy had been brought before the Committee by Mr. Newbigging and Mr. Isaac Carr. Mr. Carr had stated on three separate occasions that if gas of a lower grade such as he anticipated were supplied, the result would be that a large number of engines would be scrapped. This was either gross ignorance—he hoped it was—or something worse; it could not be a mistake. But Mr. Carr was the gentleman who thought Parliament had never understood this matter. If Mr. Carr had been endeavouring to assist Parliament, he (Mr. Lloyd) would not be surprised. But Parliament had understood it from beginning to end; and one of the very few gentlemen who had attempted to befog Parliament was Mr. Carr. Having made this slight inaccuracy, he was followed by Mr. Newbigging, who, in answer to his Lordship's question as to whether he agreed with the evidence of Mr. Carr as to the scrapping of gas-engines, said he did—another slight inaccuracy. They would never have heard any more about this but for the fact that they called Professor Burstall—and happily named he was. The slight inaccuracy was endeavoured to be developed by Mr. Courthope Munroe, who, as he (Mr. Lloyd) would have done, acted upon instructions. Mr. Burstall said the only difference was that it was a mere question of adjustment. If they had the lower-grade gas, they wanted more gas and less air; and therefore they altered the valves of the engine. Mr. Newbigging said that with reference to gas for heating, cooking, and power there would be a reduction of 15 per cent. in efficiency; or for the future, in order to get the result which 1000 cubic feet of gas per hour produced, 1150 cubic feet would have to be used. To-day, 1000 cubic feet of gas would cost 2s. 6d. Taking the saving of 3·85d. which Mr. Newbigging gave, the 1150 cubic feet would cost the user in the future 2s. 2·15d., and therefore he would pay 2s. 6·07d. for the 1150 cubic feet. Upon his own figures, the result would be that the engine would be worked at an extra cost of 7-100ths of a penny. Again, he did not accept this. There was on his side of the table a large gathering of gentlemen connected with the gas industry, and various witnesses fairly representative of it had been called. Those who had been called on the other side were gentlemen who, if they would allow him to say so (because there were some few in every profession, and many in his own), had a "crank." He did not say this offensively or unadvisedly. Mr. Carr had perhaps exhibited one of his already. But, in addition to this, he was one of those gentlemen who were like the twelfth man on the jury, who disagreed with everybody, and thought the other eleven were the most obstinate men in the world. Mr. Carr had his own view, and was strongly under the impression that, though these matters of gas legislation had been dealt with by Parliament for years to the satisfaction and admiration of the public, neither Parliament nor the Board of Trade had understood the question till that day. Mr. Newbigging, again, occupied a somewhat curious position. He had told the Committee that in Manchester they used to supply 19-candle gas measured by the flat-flame burner, and that they had now reduced it to between 13 and 14 candles. He (Mr. Lloyd) wondered whether Mr. Newbigging had scrapped all the gas-engines, and whether he was flooded with complaints because of the reduction. It was admitted that the flat-flame burner was unreliable for measuring low-grade gas; and when Mr. Newbigging said he reduced the candle power in this way, he did nothing of the sort. He did it as measured by the flat-flame burner, it was true; but he did not as supplied to the consumer, because when he had manufactured the gas it went to the consumer after being tested by the flat-flame burner, which was admittedly inaccurate for such a gas. After doing this, he adopted the "Metropolitan" No. 2 burner; and he said: "I altered the title, and called what I have hitherto called 13 and 14 candle gas by the old flat-flame burner, 17-candle gas by the No. 2 burner." The transaction sounded very well; but what Mr. Newbigging in fact did was to change what was a gas accurately measured by the flat-flame burner at 19 candles to gas measured by the No. 2 burner at 17 candles. Manchester could alter the candle power just as it liked, subject to the consumer crying out, without affecting the financial basis of the undertaking in any way. The next witness was Dr. Percy Frankland, who was a very able gentleman. But he, too, had a "crank" on this subject, because his view was that gas of high illuminating power was *the* gas, and ought to be maintained, and that Parliament had been mistaken for years in its policy of reducing it. Dr. Teed also seemed to have some curious cranks, because he was a gentleman who was formerly a gas examiner, and his view was that the No. 2 burner was not at all a good one for testing purposes. It really seemed to him (Mr. Lloyd) that the opponents of the Bill had gone round to collect the gentlemen who had extraordinary views on each particular subject, because the whole gas industry agreed that the No. 2 burner was the proper one. It was the prescribed burner, the one which was in the Model Bill, the one which was put into every Act of Parliament passed, and the one which Mr. Ram said should be adopted for all cases except Liverpool.

Mr. RAM: *Sub modo.*

Mr. LLOYD said he was coming to that. Mr. Carr, of all people, said it was the right burner, and that he had taken it himself. Mr. Newbigging had adopted it; and yet, forsooth, Dr. Teed came and said it was not the best burner for testing purposes. He (Counsel) could not follow him. With regard to the adoption of the No. 2 burner *sub modo*, the whole of the case for the opposition had been: "The No. 2 is probably the best burner, the accepted burner, and practically the parliamentary burner; but if it is adopted and prescribed here, we, the consumers, ought to have the whole benefit." They called attention to the Brighton case.

Mr. RAM: The Brighton case was that the consumer ought to share the benefit.

Mr. LLOYD: Ah! share the benefit. Continuing, he said the whole case against the promoters had been that they were not entitled to anything more—that their sliding-scale had been fixed by Parliament at a certain figure, that the price of so many candles reduction was so much per candle, and that the standard price ought to be reduced to so much a candle to correspond with the whole of the benefit. When the suggested clause was produced, it was a revelation to him, for it proved his case up to the hilt. If the Bill was passed, Mr. Ram asked the Committee to "ensure that we get for the same price the article that we have been getting in the past—that is, that we shall have the statutory

candle power *plus* something more in the way of candle power ordered by the Board of Trade." This was the whole of the main case; but he would make one special remark in reference to Liverpool, because Mr. Ram had suggested that they should differentiate as between the Liverpool Company and the others. Liverpool was unique, inasmuch as it still had 20 candle gas; and in this regard it was true that the flat-flame burner was a much more accurate one for testing. According to the figures given, the position would be practically the same for the consumers of gas for engine, motor power, and heating purposes; and the only people who would suffer to any extent would be those who still retained the flat-flame burner, who would be under the necessity of providing a burner, at a very small cost indeed, which would consume the right amount of gas under the altered conditions. There would be a saving in the Liverpool case which must result in a reduction in the price of gas; but, unfortunately, the high candle power there meant the unnecessarily high price that must exist. Unless injustice was done, it was highly desirable that there should be a uniform test. He admitted that there was a distinction between Liverpool and the other places; but he asked the Committee to say that the principle was right, and that it applied to all. If, however, they thought there was a distinction between Liverpool and the others, then he would ask them to exclude it.

The CHAIRMAN: You admitted just now that the flat-flame test was an accurate one for gas of high candle power. I think it has been suggested that the No. 2 burner is not very accurate for so high a power as 20 candles?

Mr. LLOYD: I think the real point about the No. 2 burner is that it is equally accurate for all grades of gas by means of the regulation of the air supply.

Mr. RAM disagreed with this, and submitted that in the case of Liverpool the test with the No. 2 burner was no test at all.

Mr. *Carpenter* was recalled on the point, and said the No. 2 burner was an accurate test for 20-candle gas, with the reservation that a smaller quantity of gas would be required to be consumed, and the illuminating power calculated from that quantity. With a very rich gas, the flame would, if 5 cubic feet were burnt within it, tail above the chimney. In order to get over this defect, a smaller quantity of gas must be used. He thought that if there had been other cases in which the illuminating power of the gas was 20 candles, the burner would have been made to suit it; but it was because there was only the one case of Liverpool that this was not part of the construction of the burner. They were to burn 4 instead of 5 cubic feet of gas an hour; and if 4 cubic feet gave 16 candles, 5 cubic feet would give 20 candles. The private consumer would turn down the gas to the lower quantity; or, supposing the Liverpool consumers were furnished with this burner, instead of having a governor that would pass 5 cubic feet he would have one that would give a smaller quantity.

Lord WILLOUGHBY DE BROKE: Would not that present a difficulty to the poor consumer of Liverpool?

Witness: I do not think it would. The poor consumer would use his gas in the same way that he would use his oil.

Mr. RAM: The Liverpool Act says the test is not to be any test that may be devised, but a specified test with 5 cubic feet of gas an hour?

Witness: Yes.

The Committee then considered their decision in private. When the parties were again called in,

The CHAIRMAN said: The Committee find that the preamble of the Bill is proved, and that it may proceed.

Mr. RAM said, with regard to Bill No. 2, that there were matters which would have to be brought up with respect to the calorific test and other things; and, having regard to the decision of the Committee, the opponents would like to consider the position. It might not be necessary to trouble the Committee at all; but there were many interests to consult.

Wednesday, April 13.

When the Committee met this morning,

Mr. RAM announced that the opponents of the Bill had very carefully considered the decision of the Committee. The Committee would recollect that both Mr. Talbot and himself had asked for the Bill to be rejected; but he (Mr. Ram) asked the Committee to consider a clause to the effect that the Bill should not take effect until such time as there had been an inquiry to see whether the particular provisions of each individual company were guarded in the interests of the consumers. Now he asked the Committee whether the opponents of the No. 1 Bill were to understand that, by the decision of the Committee, they had decided against the opponents in that matter also—in other words, in allowing the Bill to proceed, the Committee did not view with favour that such a clause should be brought forward. The opponents were not quite clear that, in giving their decision that the Bill should proceed, they intended to debar the opponents from bringing forward the clause, or whether the Committee had decided it.

The CHAIRMAN: We decided against you, Mr. Ram, when we passed the preamble. We considered this clause, and decided not to insert it in the Bill.

Mr. RAM remarked that on this they had carefully considered the whole situation, and they did not propose to occupy the time of the Committee further. But they reserved the right to oppose in the other House. There were many companies who appeared in the schedule to Bills Nos. 2 and 3; and they thought they ought not to appear again since the Committee had thoroughly thrashed the matter out on the first case. But he wished publicly to reserve their right—in no way were they there not opposing, but they were opposing—to carry on their opposition hereafter.

Mr. HUTCHINSON, on behalf of the promoters, said that was thoroughly understood; and they would not take any advantage of the very sensible line taken by the opponents. With regard to the Bills Nos. 2 and 3, he proposed to prove the preambles; and the Bills would then leave their Lordships' House.

Mr. *Cash* proved the preambles, and remarked that the only difference there was in these Bills to Bill No. 1 was that in the schedules there were different companies appearing.

The Committee formally ordered the Bills to proceed.

Mr. KEEN then brought up the following clause, which he asked to have inserted in Bills Nos. 2 and 3.

> Within six months from the passing of this Act, the Radcliffe and Pilkington Gas Company, in this section called "the Company," shall provide a new testing-place with all necessary apparatus for testing the illuminating power, calorific value, pressure, and purity of the gas supplied by the Company at the office of the Radcliffe and Pilkington Urban District Council, and that Council shall provide a proper and sufficient room for that purpose. The said testing-place shall be deemed to be an additional prescribed testing-place for the purposes of section 28 of the Radcliffe and Pilkington Gas Act, 1878, and for the purposes of the provisions of the Gas-Works Clauses Act, 1871, by that Act incorporated.

After a short discussion, the Committee rejected the clause.

SOME SUPPLEMENTARY NOTES OF THE EVIDENCE.

The recording of the concluding stages of the Bill before the Committee of the House of Lords, affords an opportunity for noticing some of the points in the evidence both for and against the measure which were omitted from the report of the proceedings as given in last week's issue (pp. 119-121). It must, of course, be distinctly understood that the following notes are supplementary to, and not in substitution of, what then appeared.

In the course of his re-examination, Mr. Charles Carpenter—the first witness called by the promoters—was asked, from his experience of the South Metropolitan Company, about what percentage of flat-flame burners he thought were used in the Metropolitan area. He replied that he supposed from 10 to 20 per cent. existed; but he could not think that they were very much used. They were found in odd places, where it would not be worth while to put an incandescent burner, but where a flat-flame remained in position for use if wanted. The remainder were incandescent burners which would not be detrimentally affected by the change proposed in the Bill. In fact, matters would really be improved, because they would be dealing with a gas that more nearly conformed with the gas which was used where the burners were made. That was to say, most of them came from abroad, where the quality of the gas more nearly approached that which it was now suggested it would be a good thing to supply. The amount of incandescent lighting and flat flames was very much the same all over England. There had been an enormous amount of unnecessary fuss made about the new test-burner. If it had been the case that the supply of gas under test by the burner entailed a larger consumption by the public, it would have been noticed in the returns. He had endeavoured to make it clear that his Company did not find what the opponents to their propositions prophesied they must undoubtedly find. That was to say, they found that there was less increase in their consumption, rather than the greatly accelerated one which had been spoken of.

The next witness was Mr. W. J. A. Butterfield, M.A., F I.C., who gave evidence with regard to the provisions as to illuminating power contained in the Metropolis Gas Act 1860, and the changes introduced by the City of London Gas Act, 1868. It was, he said, plain that the intention of Parliament was to prescribe a burner which was suitable for obtaining from gas the greatest amount of light in it. The methods of manufacture of gas, and therefore the composition of the gas, had changed; and the change had rendered the No 1 argand no longer the most suitable testing burner. He thought it was desirable that all the companies' gas should be tested by the same standard burner. Such an evenness of standard would have an effect upon the appliances used for burning gas—such as stoves, fires, and fittings. They could be standardized; and it was reasonable to suppose that they would be cheaper and more expeditiously made if that were so. The No. 1 argand obtained the greatest amount of light from gas only of a particular quality and composition; whereas the No. 2 burner secured the greatest amount of light from gas of widely varying quality and composition. When testing with the No. 1 argand, the differences recorded in the burner had no fixed relation to the differences recorded in the use of a flat-flame burner. On the other hand, for the qualities of gas ordinarily supplied, a variation in the quality of gas as tested in the No. 2 burner was closely followed by a variation in the illuminating power obtainable in a flat-flame burner by the consumer. As to suggestions for the imposition of a calorific standard, he did not consider that there had been a sufficient investigation up to the present time to determine a satisfactory standard with regard to the different gases. It was only in London that they were yet in a position to know exactly what calorific power they might expect the gas they supplied would have in their ordinary methods of manufacture, because there had been a period of experimental testing of the gas for calorific power. The Gaslight and Coke Company had a standard which he thought they would find it difficult to maintain, if they only just fulfilled the legal obligation in regard to their illuminating power. Provincial companies should have a similar period of experimental testing before any standard of calorific power was imposed upon them. When information was secured as to what calorific standard could be complied with, it would be realized generally that testing for illuminating power was unnecessary.

Mr. W. C. Young, F.I.C., F.C.S., Gas Examiner for the City of London, who also expressed a favourable opinion of the provisions of the Bill, said it was a desirable one in the interests of all concerned. The change in the burner would enable the companies to supply gas of a slightly lower quality than at present—it would depend upon the conditions applying to the particular case. He explained how it was to his mind that the companies were not all affected alike by the Bill, from all points of view. He was gas examiner for about twenty local authorities.

In cross-examination, witness assented to propositions put to him that he had indicated the variety of circumstances under which the different companies' gas was tested; that he had indicated many varieties as to candle power and other matters; and that he had indicated also quite clearly that the adoption of the No. 2 burner would have different effects with different companies.

In regard to the next two witnesses for the promoters, Mr. James W. Helps, of Croydon, was asked in cross-examination whether he had

considered how the change would affect people who wanted gas for the purpose of cooking and heating. He replied that he found the loss in calorific power due to the slight reduction in illuminating power was so very, very slight—especially taking into consideration the small percentage of the theoretical heat units that were utilized in cooking and heating—that the loss would be hardly appreciable. It would be so slight that it hardly came within the realm of practical politics. He was, of course, speaking of gas of between 14 and 15 candle power. As to the loss to flat-flame consumers, in nine cases out of ten the substitution of one flat-flame burner for another would make up for any slight loss which might accrue from the reduction in the illuminating power of the gas.

Mr. Edward Allen, of Liverpool, expressed the opinion that there should be a uniform test throughout the country, and that the proposed burner gave a fair and true result for all qualities of gas from 10 to 20 candles. If any benefit accrued to the company from the change, the consumer would immediately get the whole of it.

Cross-examined, witness admitted that the Mersey Docks Board, who were very large customers, appreciated the high-grade gas now being supplied in Liverpool. They had a number of engines installed; but these would not be affected by the change. He certainly disputed that if the candle power was reduced these engines would become scrap iron. He added: "If you wish for my opinion, I will give it to you. It is my knowledge, from very careful experiments, that if this new burner is adopted—I will call it a new burner—they would not be affected more than to the extent of probably 1 per cent., and possibly not that. Therefore I do not consider that our action in this matter is in the slightest degree detrimental to that customer or other customers." He denied that if his gas was tested by the No. 2 burner instead of the flat flame it would reduce the illuminating power to the consumer by 5 candles. The number of gas-engines in Liverpool was 1361.

With the examination of Mr. Corbet Woodall (whose evidence was reported at some length last week) and Mr. William Cash, the case for the Bill was concluded. On the subject of the calorific test, Mr. Corbet Woodall expressed the opinion that if this was imposed, the illuminating test should be abolished. He would take one or the other; but he thought it unfair to have both. In Continental practice, especially in Germany, the illuminating power tests had been almost completely dropped. He had much to do with the supply of gas in Frankfort; and there the illuminating power test was not now used. The gas was tested wholly for calorific value, on the ground that the luminosity of the flame was now of so little moment that it was only of importance in such burners as the argand, which was not used generally for private purposes, and the flat-flame burner, which should be abolished, as it was so very, very wasteful. All the gas that was used in incandescent burners was wanted only for the purpose of heating value; and, as a matter of course, with regard to gas which was used for power, cooking, and heating, the same thing applied. Probably of the gas which was now sent out by the gas companies, from 90 to 95 per cent. was used for purposes where the luminosity of the flame mattered nothing. The reason why it would be unfair to take two tests was because of the opportunities of differences between authorities. There was a great deal of dispute about the tests; and they did not necessarily go together. The calorific value did not necessarily follow the illuminating value. The circumstances that affected one did not affect the other. The Gaslight and Coke Company last year agreed to a trial of the calorific test, in order to placate the County Council. The Chairman: "Has it been accompanied by any inconvenience since?" Witness: "By no special inconvenience; but it has been found that working even with an illuminating value of 15 candles, the Company are not able to maintain the calorific value that was specified in last year's Act. I may say it is but a temporary arrangement. At the end of three years, the Company and the County Council are at liberty to reconsider the standard as to calorific power." Lord Sandys: "The calorific test seems to be the important one?" Witness: "There is no question whatever that the calorific standard is by far the more important; but I think it would be folly, because useless, to have the two."

The first witness called on behalf of the opponents was Mr. Isaac Carr, of Widnes, who, in addition to the evidence recorded last week, was cross-examined to some extent on the question of calorific power. In answer to questions, he stated that he did most assuredly suggest that there were gas-engines in Liverpool which could not be worked if the gas was tested with the No. 2 burner. With a gas which was returned at 20-candle power in the No. 2 burner, engines working at their maximum capacity now would no longer perform the same services. In the eighty cases in which the No. 2 burner had been adopted, all the gas-engines had not been put out of use. They would require more gas; and in cases in which the engines had been working to their full capacity with the higher quality of gas, the engines had either had to be scrapped or replaced by larger ones. The Glasgow Corporation were, he admitted, at present before Parliament proposing to reduce the illuminating power of their gas to 14 candles; and nobody was opposing it. He was not going to suggest that gas-engines in Liverpool and in Glasgow were altogether different. The Chairman: "I think we have been told that Glasgow gas was 25-candle power; it is now 16 candles; and they are asking for 14 candles. The point is did any gas-engines go out of use when it was reduced from 25 to 16 candles?" Counsel: "There has been no evidence of anything of that sort."

Mr. J. G. Newbigging, the Gas Engineer to the Manchester Corporation, who was the second witness called for the opponents (following Mr. Isaac Carr, of Widnes), the points of whose evidence were given last week, said, referring to Liverpool, that according to experiments made, extending over a great number of years, the effect of the Bill would be that the Liverpool United Gas Company would be able to distribute gas showing 15-candle power in the flat-flame burner which would give 20-candle power in the "Metropolitan" No. 2. At Manchester, the supply of gas had always been in the hands of the Corporation, who secured a very early Act—about 1844, and who had no prescribed illuminating power and no burner. For many years up to the early part of 1907 they tested the gas with the flat-flame burner; and they had gradually come down from about 19-candle power to 14 candles—between 13 and 14. Then they thought that they would put themselves in line with other undertakings, and adopt the "Metropolitan" No. 2 burner. The same gas that was before between 13 and 14 candles, was now returned, with the No. 2 burner, at something between 17½ and 18 candles. They changed the test-burner; but they did not change the quality of the gas. They took credit for the higher illuminating power without altering the gas. He had conducted experiments in order to determine the effect of the introduction of this burner. Taking Liverpool, he found the flat-flame consumer now got an efficiency of 4-candle power per cubic foot of gas; while with the new burner he would only obtain 3 candles. He had proved from a number of tests that the reduction of efficiency was about 2 per cent. per candle in an incandescent burner; so with 5 candles this would mean a reduction in efficiency of 10 per cent. Of course, in the photometer-room, by adjusting the burners, a skilled photometrist might get very close efficiencies, as he himself had done. With reference to calorific power, he found that the reduction of each candle meant a reduction in heating value of 3 per cent. This was taking the mean of many tests. Consequently, for 5 candles the reduction in heating value would be 15 per cent. Calculated in money, the effect of the reduction of 5 candles on the 20-candle gas in Liverpool, reckoned on a basis of 2s. 6d. per 1000 cubic feet, would be as follows: In the case of the flat-flame consumers, the increased cost would be 7½d. on 1000 cubic feet; for heating, cooking, and motive power, 4½d., and for incandescent lighting, 3d. The economy to Liverpool of manufacturing the lower quality gas, he took at 3·85d. per 1000 cubic feet. This figure was arrived at as the result of experiments carried out at Fazakerley, along with Mr. Carr and Professor Frankland. Supposing the change were sanctioned, and the Company reduced the price of gas by 3·85d. per 1000 feet, it would compensate the consumer who used incandescent burners, but not the others.

Witness was cross-examined at some length—the first questions having reference to the Manchester gas undertaking. He admitted that handsome profits were made, and that a large proportion went to the relief of the rates. This sum varied from £50,000 to £70,000 a year, though the Chairman of the Committee and some members were opposed to it. He himself was. Of course, the gas consumers were also the ratepayers largely. The Corporation did supply some people outside Manchester; and they charged a differential rate of 3d. per 1000 cubic feet. This was the extra cost of distributing the gas a long distance—8 or 9 miles. The anxiety of the Corporation was to see that the consumer got the full value for his money in one form or another. It was true that the consumer was not necessarily a ratepayer; but one very rarely found that the ratepayer did not consume gas. So that they were really one and the same person. Formerly they tested with the batswing burner. This was an accurate test for the quality of gas supplied at the time; but, with the introduction of the incandescent burner, it was thought that it would be better not to enrich the gas, but to give to the consumer the money which they had been expending in doing so. He would not advise his Corporation to adopt the batswing test to-day. Accepting this answer, Counsel asked: "And is it because the present No. 2 burner is the proper and efficient and accurate burner for gas as consumed to-day, that the Corporation adopt it?" Witness's reply was: "Certainly. Do not think I am opposing the use of the burner. I do not wish to do that. I think it is the best burner; but I think that, in any change that is made from one burner to another, the consumer should at least have the benefit of the saving." He admitted that, though the No. 1 burner was intended to be such as to be the most suitable for obtaining from the gas the greatest amount of light, it would not in all cases do so. It varied according to the quality of the gas. The new No. 2 burner was not the most suitable for obtaining from the gas the greatest amount of light; but he agreed that it was really a burner which ought to have been invented to comply with the provisions of the 1860 Act. There was another burner which gave still better results. He admitted that, for some gases, since 1860, inasmuch as a burner which was inaccurate had been used, the purveyors of gas had necessarily had to go to the expense of manufacturing an article higher in value in order to produce the value which was intended. He did not, however, regard the matter in the light that all this time an injustice had been done to the purveyor of gas. They were seeking to provide a test which would enable them to manufacture perhaps at a less cost; but he maintained that this saving in cost should go to the consumer. Counsel: "In other words, because the purveyors (in your language) of certain classes of gas have for half-a-century suffered a loss which Parliament never intended them to suffer, then because somebody has invented a burner which gets rid of that loss, you claim the benefit for the consumer?" Witness: "Yes, I do." Continuing, Counsel pointed out that as the Liverpool Company already paid maximum dividends, the whole of any saving effected in cost of production would go to the consumer. Witness agreed that under present conditions this would be so; but he added that there might be mismanagement. The Liverpool Company was, he said, most admirably managed now; but the same standard of management might not appertain in years to come, if Mr. Allen left. He thought therefore that it was only common justice to the consumers that they should have some protection from Parliament—that they should not simply rely on the Company. The Chairman: "Are you of opinion that the substitution of the No. 2 burner for the flat-flame standard burner in Liverpool will throw a lot of gas-engines on to the scrap heap?" Witness: "Where they are being worked up to their maximum power—that is, where a 20 H.P. engine is working with the present gas up to its maximum—the lower power gas certainly would necessitate a new engine, or working the engine at a lower horse power."

The next witness on the same side was Professor Percy Frankland, F.R.S., of the Birmingham University. He began by stating that he had always been emphatic on the advantage accruing to the consumer by the supply of high-grade gas, or gas of high illuminating power. The higher the illuminating power of the gas, the more advantageous it was to the consumer. All reductions in this respect were detrimental to the consumer. The Bill did not propose ostensibly to reduce the illuminating power of gas; but it might have this effect if the companies only delivered gas of the present nominal value. That was to say, it would enable them to supply lower grade gas which would still be within their existing parliamentary prescription. It would still be labelled with the same number of candles. For instance, in Liverpool they could supply gas of 15-candle power as tested by the present burner, which would come out as 20-candle gas by the new burner. Such a course would force the consumer to make a choice between

getting a less good result and burning more gas. He had made experiments at the Fazakerley Gas-Works of the Liverpool Corporation. The gas there which by the present flat-flame standard burner gave 14·1-candle power, with the "Metropolitan" No. 2 burner gave 19·1 candles. Dealing with the question of calorific power, he said that the calorific power of the gas to which he had been referring was 523·2 B.Th.U.; while the Liverpool Company's present gas he found to be 667 B.Th.U. net. In the reduction of 1 candle in illuminating power, there was about 3 per cent. diminution in the calorific power. But, of course, the gases must be of the same kind, and produced in much the same way. With what he would call 14-candle gas, as tested by the batswing burner, he got an efficiency of 18·14 candles per cubic foot in the incandescent burner; and with the Liverpool Company's gas (21 candles), he obtained an efficiency of 20·38 candles per cubic foot. All classes of consumers must unquestionably lose by the Bill. He calculated that the flat-flame consumer would lose 25 per cent.; the incandescent burner consumer, 8 per cent.; and the consumers of gas for heating and motive power, 15 per cent. Unless therefore some provision was introduced securing that the illuminating power or the calorific power of the gas was not reduced in fact, or securing some pecuniary compensation to the consumer, great injustice would be done to him.

One of the questions put in cross-examination was: "I understand you to say that the higher the illuminating power, the better for the consumer. You cannot have a very high opinion of Parliament under those circumstances. Parliament has been consistently reducing the illuminating power until it has got down to 14 candles, and that is in the Model Bill; and you come here and say the higher it is, the better for the consumer. Parliament has been acting against the interests of the consumer consistently for years?" To this, witness replied: "It has, unquestionably." He admitted that the tendency of the present day was to utilize the heating power of gas more than the illuminating power; but he denied that this was the main object in 90 per cent. of the cases. In Liverpool, he said, there were a very large number of people who used flat-flame burners; and in all cities the poor almost entirely employed it. People were well advised to use the flat-flame burner in Liverpool, because it was a good gas to burn in it.

This witness's evidence was followed by a short examination of Dr. F. L. Teed, who also expressed the opinion that under the Bill the consumer would get less lighting power, less heating power, and, of course, less motive power, for the same price. The consumer who used the incandescent burner would be damaged to a considerable extent, though less than would the flat-flame user. If they were to strive after uniformity in having one standard burner for testing purposes throughout the country, they should have all the other things standardized. That was to say, if they started altering the method of testing, they ought to make the burners uniform, and they ought to have the standard light uniform, the photometer uniform, and the method of testing uniform. As to the question of calorific value, he supposed this could be met entirely by considerations of price in certain cases. But it would put out of action a good many gas-heaters that were now in use. He had experienced this in London, where he had some stoves which were obtained at the time the Gaslight Company were supplying 16-candle gas by the No. 1 argand. Now the air supply had to be diminished; otherwise they roared frightfully. They were really quite obsolete. One of his objections to the lowering of high-grade gas was that they would have to arrive at their measurements by calculation. The proposed burner did not work in with a high-grade gas. In the case of 20-candle power, they could not burn as much as 5 cubic feet an hour and get the best light; and they were therefore thrown back on a calculation—which was unscientific, and ought not to be done. They should really have the flat-flame burner for testing 20-candle gas.

In cross-examination, witness maintained that the No. 2 "Metropolitan" burner was an unscientific instrument, and was not a good burner for test purposes. In fact, he did not think it should be used for testing at all.

The results of a gas-testing tour throughout were to have been detailed by Mr. A. G. Smith, Gas Examiner to the Liverpool Corporation. He submitted a table showing the figures obtained in various tests; but it was discovered that Hastings was the only place in the table which was included in the No. 1 Bill (the one before the Committee). On March 22, two tests were made there, at 7.20 and 7.25. Harcourt's table photometer was used. With the No. 1 "London" argand, the candle power was 15·28; and about five minutes afterwards the result obtained with the "Metropolitan" No. 2 burner was 18·44 candles. This meant that the same gas measured by the new means indicated a nominal increase of 3·16-candle power.

Professor F. W. Burstall, of Birmingham University, was called on behalf of the promoters, and said that, retained by the Mersey Docks and Harbour Board, he had visited their premises in Liverpool. There were four gas-engines, each of 600 H.P., engaged in pumping out the dry docks; and as at present arranged, these required a high-grade gas of approximately 700 B.Th.U. per cubic foot. To pump the docks out in the time at disposal, they had to work at absolutely full load. No explosions were cut out at all. If the calorific power of the gas was lowered by (say) 10 per cent. from its present standard, the power of the engines would fall off by 10 per cent. or more. That was to say, the engines now giving 620 H.P., would not then furnish more than 540 H.P. If the reduction was 15 per cent., the power would be still lower. In the case of the Dock Board, a lowering of the calorific power of the gas would therefore involve the provision of new engines or substantial alterations to the existing ones, either of which course would entail large capital outlay, as the money value of each engine was about £3000. In addition, there were smaller engines employed, which would also be permanently lowered in their full-power capacity. Asked whether he was one of those who thought it a desirable thing to lower the candle power of gas, witness said: "I think it is quite indifferent, so long as it is done on a heat-unit base. On a calorific base, I think it is quite indifferent whether you reduce the standard or not. I consider it is just as advantageous to have 2000 cubic feet of weak gas as to have 1000 cubic feet of rich gas, provided you pay the same for the two lots." A gas-engine *per se*, he added, was not in the least dependent on a high quality of gas. His own gas-engine at Birmingham worked on a 140 B.Th.U. gas. He considered it was the duty of whoever made the change to place the engines in a proper condition to work with the new gas. He had a table designed to show that Liverpool was at present paying the highest price for calorific power of any important undertaking in the Provinces. The table was as follows.

	Coal at 20s. per Ton, 12,000 B.Th.U. per Pound.	Heat Units per Penny. 112,000.
Mond gas at Dudley Port .	Gas at 1·5d. per 1000 cubic feet, 140 B.Th.U. per cubic foot	93,300
Widnes gas	Gas at 10d., 700 B.Th.U.	70,000
Coke-oven gas	Gas at 6d., 400 B.Th.U.	66,600
Birmingham gas	Gas at 1s. 6d., 600 B.Th.U.	33,300
Liverpool gas.	Gas at 2s. 6d., 700 B.Th.U.	23,300

In reply to some questions put to Professor Burstall in cross-examination, he said he had no objection to weak gas. He thought it was the right direction to work in. Counsel suggested that if there was an engine using gas of 700 B.Th.U., and it was desired to employ gas of 400 B.Th.U., it would be necessary to alter the valves. But to this witness replied that he might have to alter all the pipes leading up to the engine. Counsel: "So far from scrapping the engines, it is the alteration of valves, and possibly the size of pipe, if the pipe is too small?" Witness: "Yes. In other words, you would have to modify the engine to suit the new conditions." In further explanation of his point, he added that he had an engine in Birmingham that was purposely made to work with different classes of gas, ranging from 130 B.Th.U. to 180 B.Th.U.; and this engine was altered by altering the valves that were required for working it. He got the same power out of it whatever was the quality of the gas employed; but he had to make alterations to the mechanism of the engine itself.

WICKLOW GAS BILL.

The Unopposed Bills Committee of the House of Commons met on Thursday to consider the above Bill. Mr. EMMOTT presided.

Mr. COOPER, Parliamentary Agent, said the Bill was one to confer parliamentary powers on a Company, registered under the Companies Acts, who were at present supplying gas in Wicklow. The existing capital was £10,000, in preference and ordinary shares, and £2400 in mortgage debentures. Further capital power as to £4000 was sought. The terms of the Bill had been agreed with the Wicklow Urban District Council. The Company were to work under the sliding-scale arrangement with a standard price of 4s. 6d. per 1000 cubic feet. The actual prices now charged were 4s. 11d. for gas supplied to ordinary consumers, 4s. 7d. for cooking purposes, and 4s. 3d. for gas-engines; but the Company were permitted, under the arrangement with the Urban Council, to reduce these figures to 4s. 9d., 4s. 5d., and 4s. 1d. respectively. The dividend paid on the preference stock was 4½ per cent. The population was only slightly increasing; but the Company thought the consumption of gas would appreciably increase if they had more money with which to provide slot meters and cookers—a class of consumer which they did not at present effectively supply. The new capital was required for the ordinary development of the undertaking.

Mr. *G. W. Anderson*, the Managing-Director of the Company, stated that originally fresh capital powers of £6000 were sought; but an agreement with the Council had been arrived at under which the amount was to be only £4000. This sum was to be expended on retorts, a condenser, an exhauster, a gasholder, slot-cookers, parliamentary expenses, &c.

At the instance of Mr. MOON, a provision was deleted under which, instead of raising new capital under the auction clauses, the Company would have been able to allot it to shareholders.

Mr. *Anderson* having formally proved the preamble,

Mr. CULLINAN asked to be allowed to address the Committee. He stated that the Tipperary Gas Bill had been before another Committee that day, that the Committee had conceded all the objections of the opponents, but that they not being unanimous on the question of granting costs, the costs would have to be borne by the Urban District Council. The Company promoting the Tipperary Bill (which was the same as that which was promoting the Wicklow Bill) had refused to accept the Bill; and the Urban Council therefore were in the unpleasant position of having to levy the rate to meet the costs in one year. In these circumstances, he asked the present Committee to allow the Wicklow Bill to stand over so that a provision might be inserted in it for the relief of the ratepayers. The Irish Local Government Board would acquiesce in such an arrangement.

The CHAIRMAN said the Committee could not adopt the course suggested. The matter was not covered by the notices.

The clauses having been adjusted, the Bill was ordered to be reported.

Consolidated Water-Works Company of Rosario, Limited.—The ordinary general meeting of this Company was held last Tuesday. Mr. W. T. Western, who presided, in moving the adoption of the report, said the net revenue had increased by £5400, or about 11¾ per cent. A feature of the year's business was the large number of small houses connected with the Company's supply; the growth of the tramway system in the city having encouraged the formation of colonies of these houses in hitherto unoccupied districts. The motion was carried.

Petersfield Water Supply.—The Petersfield Urban District Council have decided to increase the water supply of the town. The present supply is obtained from a well in the greensand; but it is inadequate, especially in dry summer weather. The Council intend to procure water from springs at Oakshot, whence it will be conveyed by gravitation into their existing service reservoir. For supplying the portion of the district which lies above the level of the reservoir, the water will be raised by hydraulic pumps into a high-level reservoir to be constructed of ferro-concrete. The estimated cost of the scheme is about £6000.

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GLASGOW GAS CONSOLIDATION BILL.

House of Commons Committee.—Monday, April 11.

(*Before Mr.* MOONEY, *Chairman, Mr.* ESSLEMONT, *Mr.* ELVERSTON, *and Captain* TRYON.)

The Bill promoted by the Corporation of Glasgow, the opening proceedings in which were given in the "JOURNAL" last week (pp. 122-126), came again before the Committee to-day.

Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. H. BEVERIDGE appeared for the promoters. The petitioners were represented as follows: Royal Burgh of Rutherglen and Burgh of Pollokshaws, Mr. FREEMAN, K.C., and Mr. T. JONES; Burgh of Clydebank, Mr. FORBES LANKESTER, K.C., and Mr. COLIN SMITH; Burghs of Dumbarton and Milngavie and Baillieston Gas Company, Limited, Mr. BLENNERHASSETT, K.C.; Burgh of Govan, the Hon. J. D. FITZGERALD, K.C., Mr. RAM, K.C., and the Hon. EVAN CHARTERIS; Burgh of Partick, Mr. TALBOT, K.C., and Mr. CLODE; the County Council of Lanark and the District Committees of the Middle and Lower Wards of that County, Lord R. CECIL, K.C., Mr. WILSON, K.C., and Mr. KING; Caledonian Railway Company, Mr. HENDERSON; Busby and District Gas Company, Mr. WILSON, K.C. Counsel was reserved on behalf of the North British Railway Company and the Glasgow and South-Western Railway Company.

Lord R. CECIL addressed the Committee in support of the petition of the County Council of the County of Lanark for themselves and the District Committees of the Middle and Lower Wards of the County. He said he appeared for a very large portion of the proposed supplementary area, and for a considerable part of the portion of the city supply district which was outside the City of Glasgow proper. This case was one of an area relatively small, but of great power and wealth, controlling the supply of gas to everyone in a much larger area. There was no kind of elective relation between the inhabitants of the outside areas and the Corporation of Glasgow. These inhabitants had no kind of control over the Corporation gas policy; and however much they might disapprove of anything done with regard to gas, they had no remedy such as was provided for the ordinary ratepayers in Glasgow. Glasgow was in exactly the same relation to the outside areas as a company who were supplying gas would be; and its constitutional duty was to carry on the gas undertaking, not for the benefit of the outside areas, but for the benefit of the people to whom the Corporation were responsible. He did not suggest that this made it their duty to oppress or illtreat the outside areas, because that would be very foolish policy. His point was that their interest and duty were to carry on the undertaking for the benefit of their ratepayers, and not for the benefit of those living outside. The Committee had also to remember that some members of the Glasgow Corporation had stated that they proposed to use their control of gas, water, and tramways in order to induce outside areas to become part of Glasgow. In these circumstances, if the Corporation were a company supplying gas in these districts, Parliament would, as a matter of course, take great precautions to prevent their making undue profit by applying the sliding-scale arrangement. In the case of corporations, Parliament either prohibited the making of any profit or made rigid provision that all people within the limits of supply should be supplied at the same rates. In many cases both provisions had been applied. He did not think they would find any case except Glasgow in which neither had been applied with respect to any part of the outside areas. There was avowedly no provision at all as to the amount or application of profits, or with respect to the equality of treatment of those inside Glasgow and those inside the supplementary area. Moreover, by clause 26, "The Corporation may, within the supplementary supply district, or any part thereof, charge rates for gas higher than those charged within the city supply district, and such higher rates may vary in different parts of the supplementary supply district, but shall not at any time exceed the said maximum price." Thus the Corporation would be entitled to charge in the supplementary district for any supply for any purpose up to 4s. 7d. per 1000 cubic feet, and make any distinction they chose between any one class of consumer and any other class of consumer, and any one part of the district and any other part. Such provision was absolutely out of date—indeed, he doubted whether such a provision could be found in any Act. The Corporation already possessed this power; but it could only be exercised in two little places. Under the present Bill, however, the power would be enormously extended, because the supplementary area would be absolutely indefinite. The position was made worse by the fact that, under the Act of 1876, wherever the Corporation were supplying gas, no one could come in and compete against them. The suggestion that the Corporation should be limited to charging in outside areas not more than 50 per cent. more than in the City supply district was grotesque. It was an utterly indefensible proposition that, once the Corporation had crossed the line, they should be able to charge half as much again. There were an immense number of cases in which there was no geographical differential rate; and the cases in which there was such a rate, and in which the difference was 50 per cent., were so few as to be practically negligible. Normally, a difference of 10 or 15 per cent., or something of the kind, was the very utmost that was allowed. Where there was a relatively high rate, or where there was a modern grant of a differential rate, it was combined with a provision that the Corporation should make no profit out of their gas supply—an arrangement which made it much less likely that there would be any great oppression of the outside area. There should surely be equality throughout the whole limits of supply, and the Corporation should be forbidden to make profit by dealing with gas. This would mean, in effect, the abolition altogether of the supplementary area. But if for any reason the Committee held that this was going rather far, the petitioners would urge that, at the very least, there should be a strict limitation of the supplementary area, and a very much lower differential rate than anything which had been suggested—10 or 12 per cent. at the outside. No paper provisions were quite effective in a matter of this kind; so much depended on the meaning attached to the words "profits." If they put away an immense amount for depreciation, they would not have profits which ought to be applied to the reduction of the price of gas; and this was a thing that must happen, so far as he could see, in any case where they had such a state of things as existed here. Undoubtedly the real solution of such a case was the establishment of a Joint Board, which should really represent the districts supplied with gas or water. It would not be reasonable, in view of the evidence, to ask the Committee to compel the establishment of a Joint Board; but the matter was one which must be considered by Parliament, and ought to be considered by the Committee. It was a matter on which the Committee might very properly express their opinion when giving their decision.

Mr. BALFOUR BROWNE: I want to point out that my learned friend is not appearing for all the outside authorities. Renfrew, Stirling, and Dumbarton are all assenting to these very provisions that he is objecting to. They are not here; and they assent to the 50 per cent. in the Bill.

Lord R. CECIL: I do not know anything about them at all.

Mr. FITZGERALD said the cases of the Burgh of Govan and of other burghs were very similar; and it had been arranged therefore that, so far as the facts and considerations representative of the various burghs were similar, he should present the general case to the Committee. By clause 26, the promoters proposed to re-enact the maximum price of 4s. 7d. per 1000 cubic feet, which was fixed in 1869. When the actual selling price was 2s., a maximum price of 4s. 7d. was absurd. Of course, there should be a margin; and he suggested that 25 per cent.—making the maximum 2s. 6d.—would be reasonable. Clause 9 of the Act of 1882 made it absolutely obligatory that the Corporation of Glasgow should charge an equal price for all gas supplied by meter throughout the whole of their district, and also that they should make an equal charge for the public lighting. This clause prevented them charging a smaller rate for public lighting in Glasgow than in any of the outside burghs. The Law Courts had, however, held that, where gas undertakers were not prohibited from making a differential rate in different districts, they might do so. Still, the Glasgow gas undertaking had been carried on for the last 28 years on terms of perfect equality to all consumers (except in some very outside places with which he was not dealing). By the present Bill, however, it was proposed to repeal section 9 of the Act of 1882, and not to re-enact it; and there was no prohibition of differential rates, and no obligation to charge equal rates in respect of what the promoters called private lighting. There was nothing, as the Bill stood, to stop a differential rate as regarded gas for private lighting purposes in Govan or Partick, or any other burgh, and the City of Glasgow. As regarded gas supplied for purposes other than private lighting, the intention and meaning of clause 26, so far as it applied to public lighting, was to enable Glasgow to charge themselves one rate for public lighting and the burghs outside another rate. There was no ground for upsetting the arrangement of 1882. Section 9 of the Act of that year provided that: "The price to be charged for public lamps shall at all times be charged equally (regard being had to the consumption of such lamps respectively) to the Police Commissioners"—the name of the Glasgow Corporation at that time for gas purposes—"and to all local authorities of Police burghs and other districts within which the Corporation are empowered to supply gas." The present Bill would work very unfairly in this respect. The public lighting bill in Glasgow was thirteen times that of Govan. If regard was to be had to the quantity used, there was nothing to prevent Glasgow saying: "Where a quantity such as we consume is used, we shall charge 6d.; and if any other body consume the same quantity, we will charge them 6d. too." Of course, no one else consumed as much; and so Glasgow might charge themselves 6d. and other burghs 2s.

Mr. BEVERIDGE: The Corporation have made it clear that this was not their intention. If the clause is so drafted, they will alter it to meet that need.

Mr. FITZGERALD: I am not at all aware that they have made it clear that this is not their intention. On the contrary, I understood clearly that their intention was to charge themselves a lower rate.

Mr. BEVERIDGE: The initial cost of the gas in Glasgow, Govan, and Partick is to be the same. The reduction will only be on the quantity consumed.

Mr. FITZGERALD: That is the very point. They are going to make a reduction because a larger quantity is consumed in Glasgow. But what reduction? It is left entirely in their hands.

Mr. BEVERIDGE: Mr. Corbet Woodall said 15 per cent.

The CHAIRMAN: I think it is perfectly clear what the Corporation intend.

Mr. BEVERIDGE: One of our witnesses gave it as 15 per cent., and, of course, we accept that.

Mr. FITZGERALD maintained that if the Bill was passed in its present form, the Corporation would be able to do what they liked with regard to the supply of gas for public purposes. Under clause 26, moreover, the Corporation would be able to charge a differential rate when supplying for power or heating purposes based on the quantity used; so that a large consumer would be supplied at a lower rate than a small consumer. Obviously, if this clause were allowed, Glasgow would get the principal benefit, because the bulk of the large consumers were in the City. The principle to be considered was this: Was it right that a large manufacturer should get his gas cheaper than a small manufacturer? There were precedents both ways. If a lower price were charged the large consumer, the reduction would have to be made up by the other consumers. Section 9 of the Act of 1882 had worked well for 28 years; and there was no reason for altering it. Clause 27 ran: "The Corporation may, if they think fit, allow discounts or rebate to consumers of gas in consideration of prompt payment of gas charges, not exceeding in any case 5 per cent. Provided that all discounts or rebates shall be of equal amount under like circumstances to all consumers." If the Committee struck out the words "under like circumstances," the clause would be a perfect one. With reference to clause 49, relating to the application of revenue, he urged that, as the gas consumers supplied the profit, it was only reasonable that the profit, when made, should be applied to reduce the price of gas. Since 1876, there had been no case in which fresh power had been given to apply gas profits otherwise than in reduction of the price of gas; and surely what was the general law of Scotland should be the general law in Glasgow. An object lesson had been afforded by Glasgow in connection with their

water undertaking. A large portion of the water area of the Corporation was outside Glasgow; and while they charged a rate of 4d. inside, they charged a rate of 10d. outside.

Mr. FREEMAN, on behalf of Pollokshaws, prayed in aid what Mr. Fitzgerald had said; and, on behalf of Rutherglen, he said that not only had he the support of the Act of 1882, but also a statutory agreement, made at the time the private Company supplying Rutherglen was purchased by Glasgow, under which the price of gas supplied in Rutherglen and Glasgow should be the same. This parliamentary bargain had been loyally carried out by Rutherglen; and he asked the Committee to refuse to annul it.

Mr. TALBOT and Mr. COLIN SMITH having also addressed the Committee,

Mr. *Macfarlane* was recalled, and, in reply to Mr. BEVERIDGE, handed in certain tables. One showed that the capital expenditure of the Corporation on the Milngavie gas undertaking, after deducting the price of the property sold, was £9520. The total sum written off for depreciation was £2428; leaving £7092 to the debit of capital account. Another table showed the yearly expenditure in connection with the supplementary Milngavie district; the result to the year 1908-9 being an apparent surplus of £109. No allowance had, however, been made for leakage and the cost of distribution. If from the £7092 were deducted the accumulation of sinking fund, together with interest thereon at 3½ per cent., and also the surplus revenue, amounting *in cumulo* to £1741, the balance remaining unpaid at May 31 last was £5351.

Mr. *Alex. Wilson*, recalled, was examined and cross-examined with regard to details concerning the cost and size of pipes and other items connected with the supply of gas by Glasgow to Milngavie.

Mr. *H. D. Ferguson*, one of the Bailies of the Burgh of Milngavie, examined by Mr. BLENNERHASSETT, stated that when the Glasgow Corporation acquired the undertaking of the Milngavie Gas Company, it was understood that Milngavie was to be charged a differential rate only until the amount of the purchase was recouped by the Glasgow Corporation. It was on the faith of this understanding that the Milngavie Corporation consented to the purchase. He calculated that the total capital sum chargeable against Milngavie was £3666, the whole of which, together with £3660 in addition—less, however, a small percentage—had been repaid to Glasgow. The time had therefore arrived when Milngavie should become part of the City area.

Cross-examined by Mr. BEVERIDGE: He agreed that in a letter the Glasgow Corporation informed Milngavie that they would charge in that area a differential rate. If there had been an understanding with Glasgow such as he had referred to, it would have been wise on the part of Milngavie to put it in writing.

Colonel *John Birrell*, the Convener of the Lighting Committee of Milngavie, stated that prior to 1901 Milngavie was supplied by a Company, the illuminating quality of whose gas was 26 candles. He confirmed the last witness as to the understanding on which the Milngavie Council supported the transfer of the local Gas Company to the Glasgow Corporation.

Tuesday, April 12.

Colonel *Birrell*, cross-examined by Mr. BEVERIDGE, said his statement that the Milngavie Gas Company had supplied gas of 26 candle power was based on "the general information of the district."

Mr. BLENNERHASSETT then addressed the Committee on behalf of the Burgh of Milngavie. It was, he urged, a very serious thing that there should be a premium on the development of his clients' area in the form of a charge for gas 50 per cent. in excess of that in force in Glasgow and in the district within a few yards of Milngavie. On the other hand, the matter was an infinitesimal one for the Corporation of Glasgow. It was absolutely right and just that Milngavie should be included within the City area and charged the same rate for gas as was charged to Glasgow. The position from the beginning had been that Milngavie should be treated in future like other districts taken into the area of the Glasgow Corporation. When the Milngavie gas undertaking was taken over by the Glasgow Corporation, Milngavie knew that they were to be charged a differential rate; but the arrangement was to last only until the loss incurred by Glasgow in acquiring the undertaking was recouped. In the tables put in by the promoters, they seemed to have acted on the principle of charging as much as possible against Milngavie in respect of the gas undertaking. Although the mains laid to supply Milngavie were larger than were required for the purpose, and although places other than Milngavie were supplied from these mains, every shilling of the expense of the mains had been charged against Milngavie. The true and proper way to deal with this matter was that which had been submitted by Bailie Ferguson, from which it appeared that the whole of the cost incurred by Glasgow in acquiring the Milngavie gas undertaking had been repaid to Glasgow by the year 1907, and that the account between the two Corporations now showed a credit in favour of Milngavie. Differential rates were objectionable in themselves, and on general grounds should be done away with. Certainly there was nothing in the present case to justify a differential rate being charged Milngavie.

Mr. BALFOUR BROWNE said most of his learned friends who represented petitioners had deprived him of the right of reply to the cases they had presented, inasmuch as they had not called evidence. He could, however, deal with the Busby Company and the Burgh of Milngavie—evidence having been called on their behalf. In the former instance, the object was to force Glasgow to buy the whole of their undertaking. To this Glasgow objected. If they acquiesced, they would spread their limits of supply indefinitely—a thing they were not desirous of doing. There was no invasion of the Busby Company's district. If the Committee rejected this portion of the Bill, how would the people in the two localities in the Busby area now being supplied by Glasgow get gas? The Busby Company were not supplying in these localities; and if Glasgow were dislodged from them, the Busby Company, a non-statutory concern, would, as regarded these places, be put in the position of a statutory undertaking without having imposed on them any obligation to supply. As to the Milngavie petition, the principle on which Glasgow acted was that everybody getting the benefit of the gas supply should contribute fairly to the cost. Instead of having been recouped, Glasgow was still out of pocket in connection with Milngavie, and was not therefore in a position to charge a flat-rate of 2s. It was said that 4s. 7d. was a very high maximum; but a high maximum was necessary for use in the event of a coal famine occurring. If they had not a high maximum, and if a coal famine occurred, the loss would fall on the ratepayers of Glasgow. When the capital cost of the Milngavie undertaking had been recouped, the price in the place would be still further reduced; but the charge in Milngavie must always be greater than in Glasgow, because the cost of distribution and loss from leakage must always be greater in the case of Milngavie.

The CHAIRMAN: Can you tell me, from your experience of these rooms, is it often that a differential rate, when given, is expressed by a percentage?

Mr. BALFOUR BROWNE: Not often. It is usually in money. In this case, we are putting on a 50 per cent. differential rate; and this has been assented to by Renfrewshire.

The room was then cleared while the Committee deliberated in private. On the re-admission of the parties,

The CHAIRMAN said: The Committee are prepared to pass the preamble of the Bill, subject to the following conditions: (1) Milngavie and Baillieston to be included in the City supply area. (2) The Committee will allow the area of supply shown on the map in the parish of Mearns and Carmunnock, provided the Corporation purchase the undertaking of the Busby Gas Company. (3) The Committee will also require that clause 26 be altered so as to maintain the safeguards guaranteed by clause 9 of the Act of 1882, subject to differentiation for power purposes. (4) They will also require sub-section 3 to be altered so as to give the same protection to all districts in the supplemental supply area as is given to the County of Renfrew. (5) In clause 27, they will require the omission of the words "under the like circumstances." (6) In clause 49, they will require the omission of lines 23 and 24. (7) The Committee will also require that clauses 46, 47, and 51 be altered to meet the points raised by the Secretary for Scotland.

The Committee then adjourned till the next day, in order to allow the promoters to consider the Chairman's announcement.

[In explanation of the decision, it may be stated that the third condition means that an equal rate is to be charged to all consumers of gas, save consumers for power purposes; thus abolishing differential rates. The effect of the fifth condition is that, if discount is given for prompt payment of accounts, it shall be given to all consumers alike, irrespective of the amount of their account. The sixth condition provides that surplus profits shall only be applied to the gas undertaking. The seventh condition relates to certain points connected with the borrowing powers of the Corporation, and the sinking funds in connection with borrowed money and the annuities payable by the Corporation.]

Wednesday, April 13.

At the commencement of the proceedings to-day,

Mr. BLENNERHASSETT asked the Committee, before proceeding to deal with clauses, to hear him on behalf of the Baillieston Gas Company. There had been an agreement he said for the purchase between the Company and the Glasgow Corporation, and this agreement was embodied in certain clauses annexed to the Bill. One of the conditions was that the Corporation should endeavour to procure the inclusion within the supplementary supply district of the area now supplied by the Company; and it was further stipulated that, if the Corporation failed to secure the insertion of a clause to this effect, the agreement should cease to be binding. In these circumstances, the Corporation were no longer willing to carry out the agreement. The Company therefore had to go on as an independent undertaking. In 1857, the old Glasgow Gaslight Company were authorized to supply Baillieston, and in 1869 the Company's undertaking was acquired by the Glasgow Corporation, but no supply was given in Baillieston. In 1862, the Baillieston Company was formed, constructed works, and, with the permission of the Local Authority—for they had no statutory power—laid pipes. They had now served the area for 48 years; the present price of gas there being 3s. 1½d. per 1000 cubic feet. The Company were in a perfectly sound position, and all that they desired was to be let alone. They were willing to sell because they were confronted with the serious competition of the Glasgow Corporation; but they had failed to find a purchaser.

Mr. BALFOUR BROWNE: We are going to leave you alone.

Mr. BLENNERHASSETT said he desired to support the petition of the Company, which asked the Committee to exclude them altogether from the area of supply of Glasgow. The decision of the Committee placed Baillieston in the city supply area; and therefore the Company was menaced by the competition of Glasgow, at 2s. per 1000 cubic feet. Having the competition of Glasgow, it would be almost impossible for the Company to undertake any large responsibility and to expend any big sum of money, because at any time their undertaking might, practically, be ruined by the competition of Glasgow. The result would be that the locality would seriously suffer, and the Company would be paralyzed. As the Corporation had left the district alone for fifty years, the Company asked that it should not be included in their area unless the Corporation wished to purchase the undertaking. As regarded the Busby district, there was a provision that the Corporation must purchase the undertaking or be excluded from the Company's area.

Mr. BALFOUR BROWNE: I am perfectly willing to exclude you. It is only the decision of the Committee that has included you.

Mr. BLENNERHASSETT: I say that the area of the Baillieston Company should be excluded.

Mr. BALFOUR BROWNE: You have not got an area at all. You are a non-statutory Company.

Lord R. CECIL: This to some extent affects the County Council of Lanark, because the effect of this would be to exclude that portion of the County of Lanark from any possibility of receiving a supply of gas from Glasgow. My clients think that such a change would be very deleterious to the district, and that the matter ought to be left in the position in which you, Sir, left it by your decision.

Mr. ESSLEMONT (to Mr. Blennerhassett): You want to be made a statutory Company for the supply of gas?

Lord R. CECIL: That is exactly it. My learned friend asks to be given the status of a statutory company without having it, and without

having any of the obligations of a statutory company. This, continued counsel, was quite improper. If the Company chose to supply gas as a non-statutory Company, they were exposed to competition by anybody. The Company wanted to have a monopoly, and yet not to be a statutory Company. No other company had jurisdiction in the area; and the Company were not entitled to what they sought. The position, as left by the Committee the previous day, was the right one.

Mr. BALFOUR BROWNE: I am told that the Coatbridge Company have statutory powers over the whole of the area which the Baillieston Company are supplying; so that the county would not be excluded from getting a supply.

Lord R. CECIL: That makes it all the stronger, because my learned friend then will not be hurt at all.

Mr. BALFOUR BROWNE: If you alter your decision, Mr. Chairman, I am still bound to purchase. It is only if they are in the supplementary area that I am bound to purchase. Your decision was that they should be put in the city supply area; and that relieves me from the obligation to purchase. Rather than purchase, I will exclude them.

The CHAIRMAN: I may mention one of the considerations which weighed with the Committee in giving the decision they did yesterday. The interests of the public in the buying-up of the Company had very great weight with us in putting it inside the city supply area. Your exercise of the powers reserved to you under the agreement, and your decision not to buy the Company creates a new state of facts which I think we ought to consider before giving a decision.

Mr. BALFOUR BROWNE: It makes all the difference to us whether we buy a Company for £10,000 when we are entitled to charge them higher rates than we charge in the inside area, or whether we buy them when we are bound-down to charge the same rates as in the inside area. We would not give £10,000 for this Company if their area were brought into the City supply area.

Mr. BLENNERHASSETT: We do not want to alter our position. We can come in future and ask for statutory powers if we are not killed in the meantime.

The CHAIRMAN: But if we were to give the decision you ask for, do not you think it would be a very strong factor in any application that you might make hereafter to be constituted a statutory Company?

Mr. BLENNERHASSETT: Our position would remain unaltered. If we ask in future to be made a statutory Company, we should have to give good reasons. If we did not, our claim would not succeed.

The CHAIRMAN (after deliberating with his colleagues): The Committee do not see their way to alter the decision they gave yesterday on the question of Baillieston.

Mr. BLENNERHASSETT: You will not exclude it?

The CHAIRMAN: No.

Mr. BALFOUR BROWNE, referring to the decision of the Committee the previous day, said that the first point was that they would require that Milngavie be included in the City area. He had not had an opportunity of consulting the Corporation; but he had had an opportunity of consulting the Parliamentary Committee in London, and the latter were prepared to acquiesce in the decision of the Committee, and include Milngavie in the City supply area. With regard to the next point, the Corporation were not prepared to purchase the Busby Company; and, therefore, they asked the Committee to exclude the portions of Mearns and of Carmunnock which were in question. As to the third point, that clause 26 should be altered so as to maintain the safeguards guaranteed under section 9 of the Act of 1882, this had been done. The words "subject to a differentiation for power purposes" he assumed were intended to mean trade purposes generally, and accordingly words had been inserted which were identical with those of the Greenock Act of last session, save that certain words which went beyond the decision of the Committee had been omitted. The proposed new clause 26 was as follows:

(1) The price to be charged by the Corporation for gas supplied by them to persons within the limits of supply who shall take the same by meter shall not at any time exceed the maximum price of 4s. 7d. per 1000 cubic feet.

(2) Except as by this section otherwise provided, the price to be charged by the Corporation for gas consumed by meter shall at all times be charged equally to all consumers within the City supply district.

(3) The Corporation may supply gas for heating, cooking, or motive power, warming, ventilating, and for the particular requirements of any trade, undertaking, industry, manufacture, or business, and may do all things needful therefor, on such terms and conditions in all respects as may be agreed between the Corporation and the person to whom such supply shall be given (regard being had in each case to the consumption): Provided that the rate charged for gas supplied for any of such purposes shall be the same to all persons under like circumstances.

(4) The price to be charged for public lamps within the City supply district shall at all times be charged equally (regard being had to the consumption of such lamps respectively) to the Corporation and to all local authorities of burghs and other districts within the City supply district.

(5) The Corporation may, within the Supplementary supply district, or any part thereof, charge rates for gas higher than those charged within the City supply district, and such higher rates may vary in different parts of the Supplementary supply district, but shall not at any time exceed the rates charged for any similar purpose within the City supply district by more than 50 per cent. of the rate charged for private lighting purposes within the City supply district, and shall not in any case exceed the said maximum price.

The CHAIRMAN (to Mr. Fitzgerald): Do you think sub-sections 2 and 4 do not give you the protection you have at present?

Mr. FITZGERALD: I think that sub-section 2, if the words "Except as by this section otherwise provided" are left out, is effectual. Sub-section 4 I consider is effectual, too. Continuing, Counsel said that he strongly objected to the way sub-section 3 was framed. It said: "The Corporation may supply gas for heating, cooking, or motive power, warming, ventilating" and so on. But heating and cooking were ordinary domestic purposes. Gas fires and cooking stoves were quite common; and it seemed undesirable that they should be excluded from sub-section 2 unless they made the charge under sub-section 3 equal to all consumers. The words "and may do all things needful therefor, on such terms and conditions in all respects as may be agreed between the Corporation and the person to whom such supply shall be given (regard being had in each case to the consumption)" should be omitted, because their effect was not merely that the Corporation would be able to charge a lower price for gas supplied for heating, cooking, motive power, warming, and so on, but that they could differentiate the price between different consumers according to the amount each consumer took. He did not think that the Committee intended that if gas was to be supplied for heating or cooking to a workman's cottage it was to be supplied at a higher rate than that at which it was supplied to a large house where a great amount of gas was consumed.

The CHAIRMAN: What the Committee had in mind was that if you are supplying gas for lighting purposes at 2s. per 1000 cubic feet, you should be entitled to supply for power at 1s. 8d. They did not intend that the charge for power to a consumer taking 5 million cubic feet should be less than to one consuming 500,000 feet.

Mr. FITZGERALD: Then "regard being had in each case to the consumption" ought to be struck out. The words "under like circumstances" should also go out. If you strike out these words, I do not think there is really any objection to this new clause.

Mr. BALFOUR BROWNE: If it is your intention, Mr. Chairman, that there is to be no reduction to a consumer taking 5 million cubic feet as compared with one taking 500,000 feet, I do not know what the Corporation of Glasgow may say. Their object was certainly to make a reduction for a larger quantity, because it is much cheaper to give a supply in large bulk.

Mr. CRAIG HENDERSON, on behalf of the Caledonian and North British Railway Companies, said the words of the clause "regard being had in each case to the consumption" met their point that large consumers should be given an advantage.

The CHAIRMAN: I am afraid we have already decided the point. We will not give a reduction to any class of consumer.

Mr. BALFOUR BROWNE: Then as I understand there are to be two flat-rates—one for lighting and another for heating and other purposes.

The CHAIRMAN: Other purposes than lighting?

Mr. BALFOUR BROWNE: I think it is very serious. I only want to understand the decision. I must yield to it, of course. I will accept the clause modified in the way you suggest, although I want to put it on record that it places the gas undertaking at a very serious disability as compared with electric lighting, because they can and do reduce for large quantities. One of our great objects was not only to supply gas at a very cheap rate, but to avoid the smoke nuisance, which would be avoided if we could induce manufacturers to take gas for manufacturing purposes. Continuing, Counsel said that the requirement of the Committee, that the same protection should be given to all districts in the supplementary area as was given to the County of Renfrew, was effected by sub-section 5.

The CHAIRMAN: What about limiting words in sub-section 3—"the particular requirements of any trade" is a very wide definition?

Mr. BALFOUR BROWNE: I have not the least objection to making it "other than lighting." I will put in these words.

The CHAIRMAN agreed.

Mr. BALFOUR BROWNE said the next point in the Committee's decision was that lines 23 and 24 of clause 49—"and may carry any balance thereof to the credit of the Corporation for their general purposes"—should be deleted. If these words were struck out, and there was anything left after meeting the other requirements of clause 49, what was to be done with it? The Committee had not stated. Sub-section 2 of clause 49 provided that income might be used "in payment of the expenses of managing and maintaining the gas undertaking." Nothing was allowed for depreciation. If the Committee were to adopt a clause proposed by one of the opponents, and say "and any balance shall be carried to the debit or credit of the succeeding year," the Corporation would not be able to use a penny piece for depreciation. Everybody admitted that depreciation should be provided for, and therefore he proposed sub-section 5 to clause 49, that the income of the gas undertaking might be applied "in providing the sum necessary to meet depreciation." Even then there might be a surplus; and he therefore proposed a sixth sub-section, so that it might be used "in payment to the Corporation of a sum not exceeding 1d. for every 1000 cubic feet of gas sold in consideration of risk and management, which sum shall be carried to the credit of the police rate of the City." In the case of Salford last year, 1 per cent. was allowed, which was the same as 1d. per 1000 cubic feet of gas sold. An allowance for depreciation was necessary if lines 23 and 24 of clause 49 were to be deleted. If the Committee desired, he would insert words, in conformity with the Burghs Gas Supply (Scotland) Act, 1876, limiting the amount to "not less than 1½ per cent., and not more than 2 per cent." The present expenditure under this head was between 1½ and 2 per cent.

Mr. FITZGERALD thought the words of the clause as they stood would enable the Corporation to use a sum for depreciation whenever necessary; but if Mr. Balfour Browne thought the word "depreciation" should be mentioned, he would have no objection to the insertion of a proviso that the income should be used "in providing a sum necessary to meet depreciation," provided it was limited reasonably. But as regarded the proposal that income might be used in payment of a sum not exceeding 1d. per 1000 cubic feet, Mr. Balfour Browne had not told the Committee that it amounted to £70,000 per annum.

Mr. BALFOUR BROWNE said that was the amount calculated on the maximum capacity of the works. Taken on the annual consumption, it was £25,000.

Mr. FITZGERALD said, for the purpose for which he was speaking, it did not matter whether the sum was £70,000 or £25,000. Having had the power for 40 years to carry any balance to the credit of the Corporation for general purposes, they had only exercised it to the extent of £21,000 in all. Yet the provision now proposed would enable them to carry £25,000 per annum out of gas profits to the benefit of the police rate. Thus the consumers would be placed in a worse position than they were in at present. If the Committee gave them the depreciation for which they asked, and if they added, in accordance with the Burghs Gas Supply (Scotland) Act, that any balance over matters mentioned in the proposed clause should be carried to the debit or credit of the succeeding year, they would be placed on the same footing as the bulk of the gas undertakings in Scotland.

The CHAIRMAN: Did we not understand from your witnesses, Mr. Balfour Browne, that in recent years you had adopted what may be called a standard rate of depreciation—that is, 1½ per cent. on works,

3 per cent. on chemicals, 2 per cent. on pipes, 6 per cent. on meters, and 10 per cent. on stoves?

Mr. BALFOUR BROWNE: That is what we have been doing.

The CHAIRMAN: The Committee are prepared to give you power to set aside for depreciation, but not as you have put it in. They suggest that it should be altered so as to give you the standard rate of depreciation which you have adopted in your own accounts.

Mr. BALFOUR BROWNE: I have no objection to that.

Mr. FREEMAN: But nothing for management?

The CHAIRMAN: Our decision yesterday was to the effect that the Corporation should really balance expenditure and revenue, and that profits should be used in reduction of price. Therefore we cannot see our way to give that sub-clause in any shape or form.

Mr. BALFOUR BROWNE: Your words are very large; but surely we must have some working capital? No undertaking can be carried on without working capital. Even in a little place like Greenock they were allowed £2000. In every case I have heard of, working capital is allowed. In the Edinburgh case, they were allowed it, though they were not permitted to make a profit. If you leave me without this, what is to happen to me if there is an extraordinary demand? In our Electric Lighting Acts we have power to lay aside a reserve fund. I do not understand how an undertaking can be conducted without some such reserve. I ask for a certain amount of working capital and for a reserve fund.

The CHAIRMAN: I am afraid we cannot make any alteration in our decision on that point.

Mr. FITZGERALD: Will you put in the words "any balance shall be carried to the debit or credit of the succeeding year"?

The CHAIRMAN: I want to hear Mr. Balfour Browne on that. Our decision is that the money received for the undertaking should be used to balance expenditure and revenue. Therefore if you have a loss one year, it will be met out of the profit of the next year. If you have a continuing profit, the price will be reduced.

Mr. BALFOUR BROWNE: Those words of Mr. Fitzgerald (I point it out against myself) would enable us to carry forward any amount so long as we did not apply it to city purposes.

The CHAIRMAN: I want a clause brought up by you carrying out the decision of the Committee as you now understand it.

After further discussion,

The CHAIRMAN said the Committee thought the only way in which Mr. Balfour Browne could meet their view was to insert words similar to the provision in the Oldham Act.

Mr. WILSON: That provision is: "Any balance remaining in any year shall be carried forward to the revenue account of the undertaking for the next succeeding year, and shall, whenever and so soon as there shall be an amount sufficient for the purpose, be applied to the reduction of the gas charges equally throughout the limits of supply."

Mr. BALFOUR BROWNE: That is all right at the end. It depends on what goes before. In the Oldham case, they got £7500 first. You are not giving us that.

A number of other points of little importance having been disposed of, the Committee adjourned.

Thursday, April 14.

This morning, the clauses, adjusted in accordance with the decisions of the Committee, were approved; and the Bill, as amended, was ordered to be reported to the House.

TIPPERARY GAS BILL.

House of Commons Committee.—Tuesday, April 12.

(*Before Mr.* ARMITAGE, *Chairman, Major* WILLOUGHBY, *Mr.* SCANLAN, *and Mr.* HODGE.)

This is a Bill promoted by the Tipperary Gas Company, Limited, for the purpose, among other things, of conferring additional capital powers on the Company.

Mr. FREEMAN, K.C., and Mr. C. C. HUTCHINSON, appeared on behalf of the Tipperary Urban District Council (the only petitioners against the Bill). The promoters were represented by Mr. RAM, K.C., and Mr. SZLUMPER.

Mr. RAM, in opening the case for the promoters, said the requests they were making in the Bill were modest; and they were necessary for the purpose of the works. This was a limited liability Company, which was incorporated in 1882. The work now performed by the Company was formerly carried on by two private individuals—Mr. Dobbin and Mr. Burke. In 1882, the War Office required gas for some large barracks at Tipperary. The gas-works at the time were inadequate to supply the amount of gas called for; and in that year they were remodelled, and the concern turned into a limited liability Company. There was a Memorandum of Association, which fixed the capital at £10,000, in 1000 shares of £10 each; and there were mortgage debenture bonds to the amount of £3330, which had been issued to the extent of £2280. The capital to-day was £8500 in ordinary shares, and £1500 in preference shares. There were also £2280 of 5 per cent. debenture shares; making a total capital of £12,280. The Company had been working as far as they could on this; but the balance-sheet for 1909 showed that the capital was barely sufficient. To enable them to have enough floating capital for carrying on the works, the Company had had to use their undivided profits, and had also made inroads into their reserve fund. If the Company were to continue to do their duty to the public, they must have increased facilities. Up to a point, the relations between the Company and the Local Authority were altogether on a satisfactory basis, and there were no troubles. Latterly, however, there had been some friction as to the opening of roads; and the Company had found themselves gravely fettered in extending their mains. In 1903, the Company promoted a Provisional Order; and what they then asked was very much the same as in the present Bill. The result of the inquiry held by Mr. Pelham on behalf of the Board of Trade was unfavourable; and the Order was refused. One of the grounds on which the Order was refused was that the site chosen was objected to; the other two reasons being that the method of charging was peculiar, and that, relatively to some of the consumers, the price was high. With regard to the question of the site, he still could not show any alteration. It was the only one which was available. The Company had managed to pay their way, and latterly had made good dividends. They had had very little capital; and if they were asked to move the works to another site, it would result in shutting up the whole concern. For many years the Company had supplied gas practically without complaint at all; and there was no suggestion that anybody but the Company could supply Tipperary with gas. If the Company were not allowed to manufacture on this site, they could not supply at all. Lord Barrymore was the principal landowner; and it was from him that the site was leased. The area served by the Company was 3300 acres; the population being 10,000. The consumers numbered 560. The annual make of gas was 18 million cubic feet, and the annual sale 14 millions. Of this, 4 million cubic feet had been supplied to the barracks; but this had now ceased. If the Company had more capital, there was undoubtedly scope for an extension of the business. The capital worked out at £800 per million cubic feet of gas sold. There was capacity in the works for 2 million cubic feet more than they were selling to-day. The expenditure of £3000 would give them a capacity of output up to 25 million cubic feet; and this would bring their capital down to £630 per million. The Company were asking for new capital of £7000, and for borrowing powers of one-third of the amount actually raised, including the premiums. On the original capital of £8500, they asked a dividend of 10 per cent.; on the original preference capital of £1500, 5 per cent.; and on the additional and new ordinary capital, 7 per cent. For the ordinary stock they asked 7 per cent., and for the preference stock 6 per cent. It was also proposed to create a reserve fund and a special purposes fund. A standard price of 5s. was proposed, subject to a sliding-scale. At the present time the price charged was 4s. 11d. per 1000 cubic feet to ordinary consumers. One of the matters which was objected to before Mr. Pelham was that the Company were charging in some extraordinary method, and that the price was high. But now they had brought their ordinary method of charging into absolute line, and there was nothing extraordinary about it. At the time the Order was refused, the price charged was 6s. 8d. It had been gradually reduced from 6s. 8d. to the present figure of 4s. 11d. It was alleged that in 1881 something was paid in respect of goodwill, and that this ought not to be allowed to be considered in relation to capital. It was in 1881 that the undertaking was owned by Mr. Dobbin and Mr. Burke, who sold it to the Company under agreement; Mr. George Anderson being appointed Managing Director. He bought 256 shares at par, and Messrs. Dobbin and Burke retained 257 shares. These were, however, afterwards purchased by Mr. Anderson, who also took 70 preference shares. Mr. Anderson eventually made a capital analysis, and arrived at an amount which included the value of the lease, legal expenses, and so on, which he summed up under the name of goodwill. The promoters denied that there was anything that could properly be called goodwill at all; but if there was any goodwill at any time, it went into the pockets of Messrs. Dobbin and Burke, 29 years ago. Now the Council were asking that this goodwill should be eliminated from the capital.

Mr. FREEMAN pointed out that when a company were coming for certain powers, but were not asking to be incorporated as a statutory concern, the invariable practice was to proceed by Provisional Order before the Board of Trade, and not to come to Parliament as this Company had done.

Mr. RAM said that the sum of £1500 which was described as goodwill was a misnomer.

Mr. FREEMAN remarked that in the agreement between Messrs. Dobbin and Burke and the Company the expression "goodwill" occurred.

Mr. RAM submitted that if he could satisfy the Committee that the works were to-day worth the money they had put down as capital, that was the amount which ought to be allowed as capital. The Council were seeking to put difficulties in the Company's way, though they were not asking to buy them out.

Mr. *Robert Bruce Anderson* then gave evidence. He said he was the General Manager of the Tipperary Gas Company. With regard to the allegation that if the Bill was passed the Company would not have to publish their accounts, he said he was under the impression that they were compelled to publish them; but if this were not so, they were perfectly willing to be put under an obligation to do so. Regarding the reference in the petition as to the unusual mode of procedure in coming to Parliament for a Bill instead of proceeding by Provisional Order, he considered the latter procedure as more expensive, and he would not go to the Board of Trade unless it was in the case of an unopposed measure. As to the question of goodwill, he said that the agreement under which the Company was formed necessitated that the partners were to assign to the Company everything connected with the undertaking, and the goodwill and everything else was included. Not a single farthing was added to the valuation. When the Company was formed, the price of gas was 7s. 6d. per 1000 cubic feet. Prior to this, it was 8s. 4d.; now it was 4s. 11d. A large quantity of the gas sold was for power purposes and for cooking. The price now charged for cooking was 4s. 6d., and for engines 4s. Their prices were lower than other companies in similar circumstances. The Company's relations with the Local Authority had always been perfectly satisfactory; and he was unable to understand why they were opposing them. The usual practice of Parliament was to take the average price charged for gas, and add 2d. or 3d. on to it. Therefore he considered 5s. a very moderate standard price.

Cross-examined by Mr. FREEMAN, witness said he was interested in some twelve or fourteen other gas companies in Ireland. He held a considerable amount of the share capital—in some cases being the Manager, and in others the Engineer.

Mr. FREEMAN: In this particular business you are Secretary, Engineer, General Manager, and owner?

Witness: No, I am not the owner.

Your family are the principal owners of this undertaking?—My father acquired one-third of the undertaking when he was appointed Managing-Director.

I suggest to you that, on a fair valuation, there is not even approaching £10,000 worth of plant, &c., on the ground?—I think there is quite that.

Replying to further questions, witness said he agreed that when the Company passed a resolution that it should be a private concern, they thereby got rid of the obligation of publishing the accounts.

Mr. FREEMAN then proceeded to deal with the report made by Mr. Pelham as a result of the Board of Trade inquiry, and, quoting from the report with regard to the site of the gas-works, said: "I think that the present site is unsuitable for the manufacture of gas, and that at any rate no statutory authority should be given to the extension of these works on the present site."

Witness agreed that if the site was objectionable then, it was still objectionable. The report concluded with the words: "It is, of course, desirable, if possible, to bring all gas undertakings under statutory control; but in the special circumstances of the case, I do not think that it is possible to make a satisfactory arrangement."

The CHAIRMAN: Supposing you do not get this Bill, what are you going to suffer in the carrying on of your undertaking?

Witness: That is a difficult question. One must consider the difficulty in getting at the mains.

Mr. *E. H. Stevenson*, answering a question asked by a MEMBER OF THE COMMITTEE, said it was a common thing all over England among gas companies that a differential rate was charged for cooking and lighting purposes. The works at Tipperary were planned as well as the site would allow. There was no doubt the additional capital of £10,000 would be absolutely necessary. His valuation of the works came to £12,180; and there was no question that the capital was fully represented. The proposal to have a standard price of 5s. was a fair one, in view of the fact that the Company had recently lost the barracks supply. In consequence of this, the standing charges would be increased.

Wednesday, April 13.

Mr. *Stevenson* continued his evidence this morning. In cross-examination by Mr. HUTCHINSON, with regard to the procedure in coming to Parliament after having been refused a Provisional Order, he said that in 1903 the Company tried to obtain the sanction of the Board of Trade, and now they were appealing to a higher Court. He agreed that in 1903 the Board of Trade decided that the site was unsuitable for the manufacture of gas, and that Mr. Pelham, the Inspector, had had a very wide experience in gas matters. The policy of the Board of Trade was practically that where people within 300 yards radius objected, the power to use the lands for gas purposes was refused. But this was not the policy of Parliament. Parliament held that where gas-works had been for many years there was no reason to order a change. He had often appealed in the House to upset the decision of the Board of Trade, and had succeeded. In this case, the retort-houses were 60 yards away from the main street. He had known a Provisional Order, where there had been opposition, to cost £3000 or £4000. By the expenditure of £7000 they anticipated an increased sale of about 22 million feet; but he did not know where it was going to be sold, because it would be some time before they got a large number of new consumers. If it was the desire of the Local Authority not to buy the Company out, he could quite understand their pressing that there should be no Act or Order; but if they desired that the consumers should be served in the best possible way, the Company should be put under regulations. If it were decided that they should not have any parliamentary powers, the Company would probably lose all their money.

Mr. HUTCHINSON: In the Fermoy case, you said gas ought to be sold at 4s., and that anything above this would be extravagant?

Witness: I said the standard price for gas ought to be fixed at 4s. That was upon the facts in Fermoy; but the facts here are very different.

Replying to further questions, witness said that the works in Tipperary were well managed up to a certain point; but the quantity of gas made per ton of coal ought to be more. All the Company needed to enable them to carry out their duties was fixity of tenure. He held that it was absolutely impossible to make a valuation upon the contents of a document prepared 29 years ago.

Mr. *Frank Jones* was also called in support of the Bill. He agreed generally with the evidence given by Mr. Stevenson.

Mr. *Grant*, the past Manager, and Mr. *Young*, the present Manager, of the gas-works, said there had been no written complaints as to the unpleasantness of the works; and the gas supplied was good.

This closed the case for the promoters; and evidence was called on behalf of the Urban District Council.

Mr. *Allen*, of Tipperary, said the gas-works were quite close to his house, and were a serious nuisance. On the whole, with the incandescent burners be used, the gas supplied was of very fair quality. But if the Bill were passed and the present unsuitable works authorized, there would be no remedy against the Company by obtaining an injunction in case there was a nuisance. There had been general complaint as to the way in which the works had been conducted.

Mr. *Daniel Kelly* said there were 400 or 500 houses in Tipperary rented at about 1s. per week, which, even when rebuilt, would be unlikely to take a supply of gas. In Fermoy, the standard price was fixed at 4s. per 1000 cubic feet, whereas they were now charging 5s. 5d. In Tipperary, they did not wish for a similar state of things.

Mr. *Pelham*, of the Board of Trade, then gave evidence, having attended at the request of the Committee with reference to his report upon which the Provisional Order of 1903 was refused. He said that if the plant were increased from 18 million cubic feet to 35 millions, it would tend towards making the gas-works more objectionable. In 1903, his greatest difficulty was with regard to the price. The whole system was so unsatisfactory that he could not see any way out of refusing the Order. He also thought that the then capital was a great deal more than was represented by the plant.

Mr. SZLUMPER: If the question of price could be amicably arranged, would the matter of site be a small point?

Witness: I do not think I should like to express any opinion on the present application.

Witness went on to say that in 1903, if the difficulties of price and capital had been amicably settled, he might have been inclined to consider the question of the site.

Mr. *W. Newbigging* said that, having read Mr. Pelham's report, he agreed with it. The price of gas at the present time was too high. The sale of gas averaged, in the years 1907-9, 8896 cubic feet per ton of coal carbonized. Under proper management it ought to be at least 1200 cubic feet more. He had made a structural valuation of the works as scheduled to the conveyance of 1882, which amounted to £4326. There was no difficulty whatever in making such a structural valuation. It was unreasonable to suggest that Mr. George Anderson should have purchased the works in 1882 as a going concern, without paying goodwill. He had also made a valuation of the works as they existed to-day, including works and mains, amounting to £8566. If the Bill were passed, he would fix the original capital at £4326, *plus* the amount the Company had since spent; so that it would amount to about £6500.

Mr. SCANLAN: At what price do you think the Company could afford to supply gas at a profit to themselves?

Witness: At 4s.; and they would be a most successful concern.

After a short consultation, the Committee decided that the Bill ought to go through, subject to certain clauses being introduced. They decided that the price of gas ought to be fixed at a maximum of 4s. 3d. per 1000 cubic feet; they thought there was sufficient capital in the concern for its needs; on the site, the quantity they were now able to produce ought not to be increased, and they would like to hear how this could best be defined—there were certain parts of the plant which were able to produce more gas. The interest on the ordinary capital should be 7 per cent., and on the preference capital 5 per cent.; and the power to apply for an Electric Lighting Order ought to come out of the Bill.

Mr. RAM remarked that the points dealt with by the Committee were those which were really vital to the Bill; and although they were passing it, the terms imposed were such that it seemed to him to make the Bill absolutely impossible for the promoters to take it. Having regard to the great gravity of the situation, he asked that they should have time to consider the matter, because, under the terms, it was a question as to whether they could continue to survive.

Mr. FREEMAN intimated that at the next meeting of the Committee he would ask that the amount of the original capital be reduced.

Thursday, April 14.

This morning, Mr. COOPER, the Agent for the Bill, announced that, under the conditions imposed upon them by the Committee, they could not proceed. He asked leave to withdraw the Bill.

Mr. FREEMAN then asked, on behalf of the Urban District Council, for an allowance in regard to their costs in opposing the Bill; but this was refused by the Committee.

MALLOW URBAN DISTRICT GAS BILL.

House of Commons Committee.—Wednesday, April 6.

(*Before Mr.* ARMITAGE, *Chairman*, *Major* WILLOUGHBY, *Mr.* SCANLAN, *and Mr.* HODGE.)

The object of this Bill, promoted by the Mallow Urban District Council, is to empower the Urban District Council of Mallow to, among other things, supply gas, and to provide for the transfer of the undertaking of the New Mallow Gas Company to the Council.

Mr. FREEMAN, K.C., and Mr. C. C. HUTCHINSON appeared on behalf of the promoters; the Company were represented by Mr. RAM, K.C., and Mr. SZLUMPER.

Mr. FREEMAN said he could not understand why the Gas Company were opposing the Bill, because what he was asking was simply what had been granted on every single occasion that it had been asked for by Parliament during the past twenty or thirty years. There was a Gas Company at Mallow which went into liquidation in 1888; and in 1889 it was acquired by a Mr. Anderson, who was interested in a group of small Irish Gas Companies which were distinguished by one characteristic—namely, the high price charged for the gas they sold. The New Mallow Company was formed; and it was registered as a limited liability Company in 1889. The capital of the new Company was £2000, which was in 400 £5 shares, of which 200 were actually taken up. In 1905, the capital was increased by £3000, and debentures authorized up to £1500, So that up to the 6th of April, 1909, the total share capital was £3500. Since that time, preference share capital had been issued to the amount of £1500; making a total of £5000. Under the Bill which the Company promoted, and which was now before the Committee along with the Council's Bill, they were asking for £5000 of what they called original capital, and £6000 which they called the additional capital; making £11,000 in all. Under the Bill, they were asking for a dividend of 10 per cent. on the original capital, 7 per cent. on the additional capital, and 6 per cent. on the preference capital. The only object of the Bill was, of course, to improve their position, and to increase the price they would get from the Local Authority when they came to purchase. This was a small Company; the valuation of the gas-works being at the present time £110, and the mains £60. Complaints had been constantly made both as to the price and the quality of the gas. Prior to 1904, the price charged was 6s. 8d. per 1000 cubic feet; but this was reduced by various stages until at the present time it was 5s. 3d. for the gas supplied by ordinary meters and 5s. for that supplied by the slots. It had been the perpetual endeavour of the Corporation to get the Company to put the supply of gas on a more reasonable basis. There were many complaints against the Company for breaking up the roads and not restoring them to the satisfaction of the Local Authority; and in the end a conflict arose between the two parties. There were other matters of difference owing to the exceedingly high price at which the Company supplied their fittings. Things got from bad to worse; and in 1909 the Local Authority prohibited the Company breaking up the roads, and it was unanimously desired that the Council should purchase the gas undertaking. Strong objection was raised by the

Company to the proposal that the arbitration should be conducted as in railway cases; and he was willing that the arbitration should be carried out by some gentleman to be appointed by the Board of Trade. The result of the procedure under the Lands Clauses Act was an exceedingly expensive tribunal, and was perfectly unsuitable to a small undertaking of this kind. Application had been made by the Council to see the Company's books; but permission had been refused. Dealing with the petition put in by the Company, Counsel said the Company strongly objected to the proposed acquisition of the undertaking by the Council; and they submitted that there was no justification for the unusual condition that the purchase price should be ascertained in the manner suggested. Counsel concluded by asking the Committee to decide on the Council's Bill. If they decided that the Council were to purchase, there would be no necessity to go into the details of the New Mallow Gas Company's Bill.

Mr. RAM pointed out that the purchase should be conducted on such lines, and under such terms, as would insure perfect safety to the persons who were to be bought out against their will. In the Council's Bill, they were proposing a perfectly fantastic mode of arriving at the value of the undertaking, and one which could not fail to put the Company at the greatest possible disadvantage. On behalf of the Company, he could not accept the suggestion of the appointment of an arbitrator by the Board of Trade. The Company should not be made an exception to the general rule, which was that they should have compensation according to the terms of the Lands Clauses Act. If the Council inserted the arbitration clause in the usual terms of the Lands Clauses Act, and agreed to go on with their Bill, the Company's opposition would go. If this were not done, he asked the Committee, before giving their decision on the Council's Bill, to hear the Company's case on their Bill.

Mr. FREEMAN said he desired that the arbitration should be under the Lands Clauses Act, with the one exception that he did not wish to have the totally unnecessary expense of a cumbersome tribunal of three judges in a matter of this kind.

After consideration, the Committee decided that if the Urban District Council were to purchase the gas undertaking, it should be done in the usual way—namely, with two arbitrators, and, if they disagreed, an umpire.

Mr. RAM then asked the promoters to give an undertaking to go through within a reasonable time with their Bill, and use all efforts to get it passed, and, in addition, to go on with the arbitration in a reasonable time under the Lands Clauses Act, and that during the time that must elapse before the purchase was completed they would give all facilities for the opening of the roads.

Mr. FREEMAN agreed, and asked, in return, for an undertaking from the Company that they would not increase their capital or incur anything beyond ordinary expenditure without the consent of the Council, and that they would not in the interval raise the price of gas.

Mr. RAM agreed that this should be done; and he placed before the Committee a clause which he asked should be inserted in the Bill.

Mr. FREEMAN said the Council had repeatedly approached the Company with a view to negotiations for the purchase of the undertaking; but the Company refused an inspection of their books. In the clause which had now been put before the Committee, the Company were asking that there be a direction to the arbitrator varying the Lands Clauses Act by taking away the discretion of the arbitrator and putting an obligation upon him; the whole object being to increase the number of years purchase they would get, and obtain some allowance from the arbitrator for compulsory purchase. He also objected to the suggestion that the Council should pay £500 to the Company in regard to the expenses of promoting their Bill.

Mr. RAM contended that they were being compulsorily bought out.

Mr. FREEMAN also objected to the compensation of the officers of the Company, and especially to the compensation of the Managing-Director. He said that persons had recently been appointed to certain offices in order to come under the clause. It was without precedent that such a thing should be done in the case of a non-statutory Company.

The Committee decided that, as to the words with regard to compulsion, they would be omitted, because they thought it better to leave it to the arbitrator. He would have the whole of the correspondence and the proceedings before the Committee before him, and would be able to see what the position was. The portion of the clause asking the Council to pay £500 towards the cost of the Company's Bill was also struck out; and with regard to the compensation of the officers and servants of the Company, the Committee left it to the Urban District Council to treat them properly and fairly.

Kimberley Water-Works Company.—The report of the Directors of this Company for the past year sets forth that the accounts show a profit of £19,567. The sum of £554 has been provided for the usual items of depreciation and £1600 for debenture interest. The Directors propose to write off £1662 from construction, and to pay a dividend of 2½ per cent. for the six months to Dec. 31; making a total of 5 per cent. for the year. The consumption of water in the period covered was 143,106,000 gallons, compared with 172,566,600 gallons in 1908.

Bombay Gas Company, Limited.—At the meeting of the Company on the 12th prox., the Directors will report a satisfactory increase in the sale of gas amounting to 9·6 per cent., of which 12·4 per cent. was due to private consumers, and 5·8 per cent. to public lamps. The Directors, in continuation of their policy of keeping down the price of gas to as low a figure as possible, have announced to the private consumers a further reduction of 4 annas per 1000 cubic feet, to take effect from and after the 1st of July next; and they have also extended specially reduced rates to consumers of gas for power and trade purposes. It is anticipated with confidence that the increasing demands of the public will still further expand in the near future as a result of these reductions. The profit for the year, as shown by the net revenue account, amounts to £18,259; making, with £3587 brought forward, £21,846 available for distribution. After allowing for the interim dividend paid in December last (£7200), and placing £662 to the reserve fund, there remains £13,984, out of which the Directors recommend the payment of a dividend of 4 per cent., free of income-tax; making 7 per cent. for the year. This will leave £4384 to carry forward.

MISCELLANEOUS NEWS.

PUBLIC LIGHTING OF WESTMINSTER.

Electric Light to be Displaced in the West End—Competitive Tenders—Gas Recommended and Adopted.

As will be seen by the accompanying report of the Works Committee of the Westminster City Council, and by the discussion and vote at the meeting of the Council last Thursday, an important decision has been arrived at as to the lighting of Piccadilly Circus, Piccadilly, St. James' Street, Pall Mall, Regent Street, Waterloo Place, Shaftesbury Avenue, and Coventry Street. In these thoroughfares, high-pressure gas lighting, in units of from 1800 to 3000 candle power, is to take the place of electric lighting. These streets and open spaces are at present lighted by arc lamps, of which there are 66, exclusive of five of different illuminating powers lighting certain refuges. The 66 arc lamps are of the following illuminating powers: Sixteen are of 3000-candle power, four are of 1600 to 1800 candle power, and 46 are of 1000-candle power. These lamps are lighted by the St. James' and Pall Mall Electric Supply Company. The contract for the 66 lamps was entered into in 1896. They were to be 10-ampère lamps; and (there were no flame arc lamps then available) as only 1½ candles per watt at the most could be obtained, the illuminating power of the lamps was nominally 700 candles—the price being £30 apiece. The contract expired in 1905; and the Electric Company then made an offer of £20 per lamp. The Council, however, asked for tenders from the Gaslight and Coke Company; and they quoted £15 1s. for 900-candle power lamps. The Electricity Company then reduced their price to £17 for about 900-candle power; and of lamps of this illuminating power, the 46 referred to above are still in existence, but it is an existence with to-day a limit imposed on it. The other twenty lamps were changed last year, without any increase in the maintenance costs; but the Council paid in respect of conversion £162. Of course, using flame arcs, it required very little increase in the consumption of current to produce the extra light. Therefore, at the present moment there are, under the electrical contract, 66 lamps all costing £17 each per annum.

Contracts for the lighting are expiring; and the City Engineer (Mr. J. W. Bradley) called for tenders, through the Works Committee (of which Mr. Jacques Abady is the Chairman), for definite units of illumination, so as to give them means of comparing costs in respect both of gas and electric lamps. Now if one takes the district, and puts into it sixteen 3000-candle power lamps, and replaces the remainder by 1800-candle power lamps, it will mean an increase in the total light of some 50 per cent. The Electric Company quoted for 3000-candle power lamps £28 per annum, and for 1800-candle power lamps £21 per annum. The Gas Company quoted for 3000-candle power lamps £22 per annum, and for 1800-candle power ones £15 10s. Therefore, inasmuch as the lamps will be on exactly the same columns, and in exactly the same position, it will be seen that, since the lamps are to be tested photometrically and penalties inflicted for infractions of the illuminating contract, the lights will be absolutely comparable as regards candle power. The total of the Gas Company's tender (without capital costs, which came to about the same as those of the Electric Company) for maintaining the lamps was £1204 10s., as compared with £1603 for the Electric Company. The present cost (without capital) is £1209; but it must be remembered that the new prices are for 50 per cent. more light. What alternative had the Works Committee in face of these figures, seeing that they can get more illumination from the Gas Company than from the Electric Company at less cost? The other areas considered are at present lighted by low and high pressure lighting; and it need hardly be said that the Gas Company have easily held their own. The new prices will about double the light for 10 per cent. less cost.

At the Meeting of the Westminster City Council last Thursday, the question of the public lighting of the city came up for consideration, on the following report presented by the Works Committee.

The expiration this year of the street lighting contracts, practically all held by the Gaslight and Coke Company, in (*a*) Knightsbridge, (*b*) the parish of St. Margaret and St. John, (*c*) a portion of St. Martin's parish and the Strand District, and (*d*) St. James's, made it possible for the Council to deal with this question in a comprehensive manner, in relation to the marked improvements which have been made in recent years in the methods of producing artificial light from gas and electricity at less cost per unit of higher power than formerly. An opportunity was consequently afforded for generally improving upon what now exists in these districts, at a saving in the cost, or of still further improving the lighting without increase of cost. Competitive tenders were therefore obtained from the Gaslight and Coke Company and the several electric light companies for the installation of lighting units of different powers—viz., 90, 180, 300, 1800, and 3000 candles; the Council being placed in a position to select one or other of the units, according to the needs of each class of street as may be determined by considerations of width, conditions of traffic, &c. For the supply of gas or current, as the case may be, to these several units, and for general maintenance, further tenders were obtained, any of which may be accepted for a term of five, ten, or fifteen years, at the option of the Council.

It should be pointed out that the basis on which tenders were invited was so much light for a given number of hours per annum; and as a given candle power—for instance, 90 or 3000 candles—has exactly the same value whether produced by gas or by electricity, all the Committee have had to consider has been the cost of installation, and also the annual cost for the different units. The classification of streets for lighting purposes—another important matter—will be for the Council to decide at a later date. But whatever classification is adopted will not affect the comparative costs of the different methods of illumination. It may, however, be stated that, in settling the specification, certain streets of importance were named in each district in which the Council

TABLE I.—*Existing Units of Light under Contracts Terminating in* 1910.

Number of Lamps.	System.	Average Candle Power and Cost per Lamp per Annum.	Number of Lamps in			
			District A.	District B.	District C.	District D.
1568	Low-pressure gas	53 c.p., at £3 2s. 10d.	363	951	254	..
1235	,, ,, ,, (two burners)	83 c.p., at £5 9s. 6d.	20	79	580	556
27	,, ,, ,, (three ,,)	130 c.p., at £8 12s. 6d.	3	10	8	6
9	,, ,, ,, (four ,,)	— c.p., at £9 15s.	..	1	8	..
6	,, ,, ,, (five ,,)	— c.p., at £10 12s. 3d.	..	..	6	..
43	High-pressure gas	1044 c.p., at £15 1s.				
8	,, ,, ,,	473 c.p., at £13 0s. 9d.	..	33	20	..
2	,, ,, ,,	284 c.p., at £8 0s. 4d.				
46	Open arc electric lamps	911 c.p., at £17.	..	..	..	46
16	Flame arc ,, ,,	3575 c.p., at £17.	..	..	..	20
4	,, ,, ,, ,,	1656 c.p., at £17.				

N.B.—Strand district electric lighting contract, terminable in 1913 or 1920 at option of Council: 121 arc lamps, average candle power 614, at £27 18s. 3d. (average) each per annum; and 3 flame arc lamps, average candle power 1270, at £27 13s. 4d. (average) each per annum. St. George's parish electric lighting contract: (*a*) Terminable in 1913, 5 flame arc lamps, average candle power 1573, at £14 each per annum. (*b*) Terminable in 1931, 957 arc lamps, average candle power 449, at £21 2s. 5d. each per annum; and 216 lamps (various), at £3 9s. (average) each per annum.

TABLE II.—*Summary of Tenders for Installation, at Per Unit.*

Candle-Power Units.		Gas.				Electric.	
		District A.	District B.	District C.	District D.	Districts A, C, & D.	District B.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
90	Fitted to existing gas pillars	0 7 6†	0 7 6	0 7 6	0 7 6	..	..
		1 5 0‡	1 5 0	1 5 0	1 5 0	2 10 0	2 10 0
180	Do., with extension to 12 feet	0 12 6†	0 12 6	0 12 6	0 12 6	..	..
		1 5 0‡	1 5 0	1 5 0	1 5 0	2 15 0	3 0 0
		3 10 0*	3 10 0	3 10 0	3 10 0	6 10 0	6 10 0
300	Do., with extension to 15 feet	1 10 0†	1 10 0	1 10 0	1 10 0	4 0 0	4 0 0
		4 0 0‡	4 0 0	4 0 0	4 0 0	7 10 0	8 0 0
		.. ‡	2 10 0	2 10 0	..	..	..
1800	Special design pillar, 20 feet	10 0 0§	10 0 0	10 0 0	10 0 0	..	..
		20 0 0*	17 0 0	17 0 0	20 0 0	30 0 0	35 0 0
		.. ‡	2 10 0	2 10 0	..	..	..
3000	,, ,, ,,	10 0 0§	10 0 0	10 0 0	10 0 0	..	..
		21 0 0*	18 0 0	18 0 0	21 0 0	35 0 0	35 0 0

* New pillars. † Converting existing lanterns. ‡ New lantern where necessary. § New lantern on electric pillars.

TABLE III.—*Summary of Tenders for Maintenance, at per Unit per Annum* (3940 *Hours*).

Candle-Power Units.	Gas—A, B, C, and D Districts.			Electric—A, C, and D Districts.			Electric—B District.		
	5 Years.	10 Years.	15 Years.	5 Years.	10 Years.	15 Years.	5 Years.	10 Years.	15 Years.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
90	2 16 6	2 15 0	2 12 6	5 0 0	4 0 0	3 7 6	5 0 0	4 10 0	4 0 0
180	4 10 0	4 7 6	4 4 0	8 0 0	6 10 0	5 15 0	8 0 0	7 5 0	6 10 0
300	6 10 0	6 6 0	6 0 0	12 0 0	10 10 0	9 5 0	11 0 0	10 0 0	9 0 0
1800	15 10 0	15 0 0	14 5 0	21 0 0	19 5 0	17 10 0	20 0 0	19 0 0	18 0 0
3000	22 0 0	21 5 0	20 5 0	30 0 0 (28 0 0 in C and D.)	25 0 0	22 0 0	28 0 0	27 0 0	26 0 0

might, as foreshadowed above, wish to effect greater improvements by the adoption of higher lighting power units. Certain experimental installations have been set up in Victoria Street and elsewhere at the expense of the competing Companies, which constitute a practical and valuable exhibit of different forms of lighting in juxtaposition; and besides viewing these exhibits, the Committee made a tour of inspection of the systems now in use in Westminster, and extended their inspection to the City of London, where, in Fleet Street, a notable example of gas lighting is set up.

Table I. shows the existing units of lights under contracts terminating in 1910, and with which, therefore, this report deals. It will be seen from the table that the districts now being dealt with are those lighted by gas, together with the district lighted by 71 arc lamps by the St. James's and Pall Mall Electric Light Company. The electric lighting in the Strand district and throughout the parish of St. George is not affected. Table II. deals with the first cost—*i.e.*, installation; and the only remark to be made upon this is that the Gas Company offer to spread any cost over the contract period without interest, thus further increasing the difference in the cost of installation which a glance at the table will show exists between the gas and electric light tenders. Table III. deals with the annual cost—*i.e.*, the supply of various units of light, together with lighting, extinguishing, maintenance, &c.

The above quotations in Tables II. and III. for identical units of lighting need little comment. The Gas Company's tender for installation (Table II.) is very much below the electric supply companies' tenders. For lighting and maintenance (Table III.)—that is to say, the annual charge—the same marked difference in cost is shown in favour of gas, light for light. Not to labour the point too much, one comparison only is made. Worked out, the difference in cost (Table III.) for a term of five years for the five units specified is 76·99, 77·77, 80·77, 33·87, and 29·54 per cent. respectively in favour of gas. That is to say, it would cost these percentages more for maintenance year by year if electricity were preferred to gas; and for such extra cost not a single candle power better lighting would be obtained. The Committee therefore recommend the acceptance of the lowest tender—that of the Gaslight and Coke Company—for the districts at present lighted by that Company, and for that lighted by 71 arc lamps by the St. James's and Pall Mall Electric Company.

The Westminster Electric Supply Corporation supplemented their tender by an offer that if the Council extend the Company's contract for public lighting in the parish of St. George (which continues until 1931) to the whole of District B (St. Margaret and St. John), they will convert the 962 arc lamps in St. George's parish to flame arc lamps of 1800-candle power, and also convert the incandescent lamps in the same parish to metal filament lamps, at their own expense. Under the above-mentioned contract for public lighting in St. George's parish, the Council may, in certain circumstances, obtain from the Company an improvement in the lighting of the parish without additional cost; and, moreover, the cost of the supplemental scheme submitted by the Electric Light Company would be very much greater than the cost if the lowest tender (that of the Gas Company) be accepted.

In a letter, dated the 14th of March, which accompanied their tender, the Gas Company asked the Council to waive, as in former contracts, the clause relating to rates of wages and hours of labour; and, as they have their own insurance fund, amounting to £126,900, they presumed they would not be required to enter into a special insurance policy to insure the Council against any liability under the Workmen's Compensation Act, 1906, as provided in clause 22 of the conditions of contract. They also suggest that in place of the uniform penalty of 5s. per day per lamp not giving specified candle power, provided by clause 19 of the conditions of contract, the penalty should be 6d. per lamp for small units, and 5s. per lamp for large ones. The Committee see no objection to the Council modifying the conditions of contract as to wages and hours, and as to insurance, subject to protective conditions.

They recommend: (1) That the lowest tender in each district—viz., that of the Gaslight and Coke Company—be accepted for a term of five years, leaving for after-consideration the settlement of what units of lighting shall be installed street by street, when only the actual figures of cost can be worked out. (2) That the Council do waive clause 21 of the conditions of contract, relating to rates of wages and hours of labour, as regards the acceptance of the Gaslight and Coke Company's tender. (3) That the Company's insurance fund be accepted as the insurance company referred to in clause 22 of the conditions of contract during such time only as the Council shall be certified that such fund is not less than £100,000, and subject to the Council being satisfied of the stability of the fund. (4) That the Company be asked whether they are willing to continue the contract after the expiration of five years for a further period of five years, making ten years in all, on the terms of the tender for ten years, in the event of the Council so deciding, and giving the Company written notice, not less than six months before the expiration of five years of the contract period, that the contract shall be continued for such further period,

A petition from shopkeepers in Regent Street and Piccadilly was presented to the Council by Mr. F. H. Bingham, asking that the consideration of the subject dealt with in the foregoing report should be postponed "for further consideration."

On the motion for the adoption of the report and recommendations,

Mr. BINGHAM moved, as an amendment, that they be referred back for further consideration and report. He said the decision of the Committee had been arrived at at a not very full meeting; but they had come to their conclusion on a very exhaustive report, and they felt there was no alternative but to accept it. He was of opinion that the Council really had no alternative than to do likewise; but before doing so there were one or two matters which they should make quite sure of. These were: (1) That they were really paying for their light on the candle-power system; and (2) that they were getting their light under the new arrangement as cheaply as was made out, and that it would be as good as that which they were now getting. He had not been on the Sub-Committee who went round to view the lighting, but he had gone about on his own account. In Fleet Street there was a very fine light given by means of high-pressure gas; but it was to be remembered that in recent months electric lamps had been put up in Regent Street which each gave a light of 3000-candle power, and made the street probably the best-lighted thoroughfare in Europe. Municipal experts came from all quarters to see such extremely good lighting; and the inhabitants were disturbed at the prospect of being interfered with, and at the possibility that they would not get so good an illuminant. In his opinion, if it was quite certain that the illuminating power would be maintained, and the lighting be equally effective, then the Council ought to adopt gas. He, however, found in Fleet Street that the high-pressure gas-lamps were 34 yards apart; and standing midway between them he tried to read a newspaper, but could not do so. The electric lights in Regent Street were 54 yards apart, and he found that he could easily read a newspaper while standing midway between them. While he was quite prepared to admit that it was not desirable to convert the streets into reading-rooms, he held that the Council should be cautious in what they were doing. If the same light was to be given in Regent Street by gas as they had now, and the Fleet Street scheme was adopted, for every four lamps in Regent Street five-and-a-half would be wanted, and the whole of the saving supposed to be made by the adoption of gas would disappear. As he had indicated, he had an open mind on the whole question; but he certainly thought the ratepayers in the streets concerned should be considered, and that no harm could be done by postponing the subject for a fortnight. He had just been told by the Chairman of the Works Committee that the lamps in Fleet Street were not 3000, but only 1000-candle power. This being so, they should see a 3000-candle power gas-lamp burning before coming to a decision.

Mr. FLINT, seconding the amendment, said that, like the previous speaker, he was perfectly indifferent as to which illuminant was adopted, so long as it was the best and the cheapest. To people who were not familiar with recent improvements in gas, it was something of a shock to propose to go back to gas from electric light; and he favoured delay, in order that the tradesmen of Regent Street and Piccadilly might get a better knowledge of the subject. Everyone on the Sub-Committee was astonished to see the enormous decrease in cost which would be effected by adopting gas instead of electricity; and he was perfectly sure that the shopkeepers in the streets named would, at the finish, be convinced that gas was the better illuminant. Under these circumstances, and considering the heavy rates paid by these people, he was of opinion that it would be better not to press the matter to a decision at this meeting. If the tests of the City Engineer with the photometer were absolutely accurate, gas came out very much better than the electric light; and on these tests no one need be nervous about the contract not being carried out by the Gas Company to its fullest extent, as all the records showed that they kept up the candle power better than the electric light people.

Mr. JACQUES ABADY, the Chairman of the Committee, said he rose to correct a misapprehension upon which the previous speakers had founded their remarks. There was no suggestion to introduce into Regent Street lamps similar to those used in Fleet Street. In Regent Street the columns belonged to the Council, as did also the lamps; and what was proposed was that the arc lamps should be taken from the tops of the columns and high-pressure gas-lamps substituted for them. There would be 50 per cent. increase in the light at 30 per cent. cheaper cost; and the positions of the columns would be absolutely the same.

Alderman C. SPENCER-SMITH said he did not see why the whole thing should be hung up because certain people did not know what they were going to get. There was no comparison in cost between the tenders for gas and electric light.

Alderman EVERITT said the shopkeepers in Regent Street and Piccadilly were very large ratepayers, and were entitled to some consideration. He therefore favoured an adjournment. At the same time, he wished to make it perfectly clear that he was absolutely in favour of gas instead of electric lighting for the streets. He was not always so, because electric lighting was introduced into the streets by the St. George's Vestry on his casting vote as Chairman. Since then, however, the Gas Company had awakened. If they had started to make improvements before, the streets of St. George's would never have been lighted by electricity. There was no comparison now between the two illuminants; gas was unquestionably the better and the cheaper. Some of the best-lighted streets in London, or anywhere else, were now lighted with gas. The shopkeepers of Piccadilly and Regent Street paid an enormous amount in rates; and when they were fully aware of the situation, he had no doubt they would hold that the decision of the Committee was right.

Mr. GRAY endorsed the remarks of the last speaker, that when the St. George's Vestry accepted the contracts for the electric lighting of the streets improvements in gas lighting were only in their infancy.

Mr. ABADY said he was perfectly willing to take the report back, if any good object could be accomplished by so doing. He, however, failed to see what could be done. The petition simply asked that the matter should be postponed in order that it might be further considered. Considered by whom? The Committee who had charge of the matter had given it the most careful consideration—both by the Special Lighting Sub-Committee and the Works Committee; and the decision was unanimous. The tenders had been viewed on a strictly competitive basis. What he wanted to know was what the Committee had further to consider. He asked the Council to suspend their judgment as to the advisability of the matter going back until they had heard the facts which he proposed to give them. A copy of the private and unpublished report of the Committee and its recommendations had got into the hands of someone who, acting obviously in the interests of one of the parties, went round to the shopkeepers of Regent Street and got them to sign the petition on the alleged ground that reverting to gas would be a retrograde movement. That the proposal was not a retrograde one would be evident from the following facts: St. George's parish was lighted by arc lamps under a 31 years' contract already 10 years old; and as its revision was now before them, the matter was *sub judice*. Part of the main streets in the Strand district were lighted by electricity under a contract expiring in 1913; and if only they could revise this now, they could save a good deal. The rest of the city was lighted in this way: All the minor streets by low-pressure gas; Whitehall, Kingsway, &c., by high-pressure gas; and Regent Street, Piccadilly, &c., by arc lamps provided by the St. James' and Pall Mall Electricity Company. The low-pressure lighting cost about £13,000. If they accepted the Gas Company's tender, they could double the light for about 10 per cent. less cost. If they accepted the Electricity Company's tender, the same light would cost about £20,000—a difference of £8000 a year. Was there any question there as to what course they should take? The high-pressure gas lighting by 53 lamps cost £920. If they accepted the gas tender, they could just upon double the light for £7 per annum more. Electricity would cost £1400. Was there any question there? The remaining part to be decided was as to Regent Street, Piccadilly, St. James' Street, &c. Here there were 71 arc lamps—part 3000, part 1800, and part 1000 candle power—costing £1338 per annum. The Electricity Company had now put up their prices for the two former units, which were all they contemplated using, from £17 to £28 and £21 per lamp per annum; and if they fitted these 71 lamps, 16 of them with 3000-candle power and 55 with 1800 candle power, the total light would be increased by 50 per cent. it was true, but the price would be £1700 per annum, or nearly £400 a year increase. By putting 16 3000 and 55 1800 candle power high-pressure gas-lamps, they would get the same increased light, but for £1340 per annum, or what they were paying now for 50 per cent. less light; and if the contract were accepted for 10 years, which the Committee would not do—they could have saved £100 per annum. This was the decision they had come to; and how could they do otherwise, even if the matter was sent back? Was the decision of the representatives of the ratepayers to stand, or would the Council give the lighting of the streets into the hands of persons who were not elected? Right through the Committee had considered the matter on the basis of candle power; and if there was any advantage in the matter of colour, it was all on the side of gas, for flame arc lamps gave a yellow light, which was prejudicial to the appearance of the goods that shopkeepers displayed in their windows. The light of gas was very much whiter. Candle power for candle power, no matter how the light was produced, had been the basis upon which the Committee had gone; and they had no alternative, in the interests of the ratepayers, but to accept the lowest tender. As business men, they had indeed no choice in the matter. If the Council accepted the tender, they would increase the light in the West End area, where the shopkeepers were afraid that the illumination might be decreased. They were making stringent conditions as to the manner in which the light was maintained by the Company; and he could not see what good it would do to defer matters. He had no personal interest either in gas or in electricity; but he had taken an immense amount of trouble in this matter, and he wished other people had enlightened themselves on the subject before they came to the Council and talked about it being a retrograde step to go from electricity to gas. Many modern cities were abandoning electricity for gas because it was cheaper. The Commission from the Corporation of London who visited all the best Continental cities had lately, as the result of what they saw, adopted high-pressure gas lighting in the City. The Council must remember that gas had been made much cheaper by the introduction of the inverted burner. Five years ago they could only get 15 or 20 candle power per cubic foot; now they could get 25 candles on low pressure and 40 candles on high pressure. If the matter was to be postponed, who was to consider it, and how was it to be considered otherwise than had been done?

Alderman PROBYN said he thought it would be admitted that the Gas Company's tender should be accepted; but he thought it would strengthen the Committee's case not to hurry the matter, in deference to the petitioners' wishes.

Mr. GEORGE COX suggested that, as a local authority, they were not concerned with the lighting which was best for the tradesmen's shops. All they had to concern themselves with was what was the best light for the thoroughfares; and if they could get as good a light with gas as with electricity at a reduced cost, they ought to accept it, and leave to the tradesmen the matter of lighting their own premises sufficiently.

Mr. SOMERS-COCKS thought, however, that the matter might be formally adjourned for a fortnight as a sop to Cerberus, and to show that the Committee were considering the matter thoroughly; also that a letter should be sent to the petitioners.

Mr. PULMAN felt that some attention ought to be paid to the petition of the ratepayers of Piccadilly. The only doubt in their minds was whether 3000-candle high-pressure gas was absolutely co-equal with 3000-candle electric light. This was the position of the petitioners; they did not want to take any chances in the matter. He thought a light of 3000-candle power might be put up in the district in question as an experiment; and if this proved satisfactory, the contract could then be accepted.

The amendment was then put, and negatived by a large majority.

Mr. BROWNE-MARTIN (a Director of the Westminster Electricity Corporation) said he did not believe 5 per cent. of the councillors used gas in their homes, but they tried to force it on the tradesmen. He moved, as an amendment, that the Council should accept the contract, but give the Committee the option to exempt the Regent Street and Piccadilly lighting from it if they thought fit.

Mr. ABADY said the Committee had already a right to do this under the contract.

Mr. BINGHAM seconded the amendment; but on being put it was lost.

Alderman EVERITT then moved that the contract be accepted, but that the question of the 71 arc lamps in Pall Mall should be referred back. He said the Council had no right to refuse to consider the petition sent in by any ratepayers; and as the petition in question had only arrived that day, it could not be said to have received proper attention.

The amendment having been seconded,

Mr. ABADY, in reply, said he had given the gist of the petition in his speech. He felt sure that if the petitioners had known the facts which had been put before the Council that afternoon, they would never have sent in the petition; and when they heard what had been done and said, they would be quite satisfied.

The amendment was then put and lost. No other being forthcoming, the Committee's recommendations were adopted. The majorities against the amendments were in each case so large that hands were not even counted.

PUBLIC LIGHTING OF LAMBETH.

The Lighting Committee of the Lambeth Borough Council have had under consideration for some time the question of the charges made by the Gaslight and Coke Company for the public lamps, as compared with those of the South Metropolitan Company. There has also been some correspondence with the former Company, with the view of obtaining reductions in their charges in order to make those in the two districts more nearly equal. The illuminating power and price of gas supplied by the two Companies are now the same; but the charges in the Gaslight and Coke Company's district are 1s. 6d. per lamp per annum less than they would have been if it were not for the introduction of the automatic lighting system, which is not in use in the other Company's district. The South Metropolitan Company, as well as the South Suburban Gas Company, allow a discount of 5 per cent. from their charges on payment of accounts within one month from the rendering of them. These two Companies also include in their charges repairs to, or replacement of, lamps damaged, run against, or decayed beyond repair; but the Gaslight and Coke Company have not hitherto done this. In the result, they have agreed to make somewhat considerable reductions in their charges, subject to a new agreement being entered into, and for the future to accept the charges as covering the cost of replacements or repairs. The effect of these proposed new arrangements can best be seen from the following table, which is based on the present number of lamps:—

No. of Lamps.	Kind of Lamp.	Present Charge per Lamp per Annum	Total Present Cost.	New Charge per Lamp per Annum.	Total Future Cost.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
437	No. 2 burners	2 6 2	1008 14 10	2 4 4	968 13 8
148	Do.	2 4 8	330 10 8	2 4 4	328 1 4
7	Do. (day and night) . .	3 13 2	25 12 2	3 11 6	25 0 6
1	Do. with bye-pass . .	2 9 8	2 9 8	2 7 8	2 7 8
255	No. 4 burners	3 3 3	806 8 9	2 18 0	739 10 0
1	Do. on refuge	4 12 9	4 12 9	4 6 0	4 6 0
2	Do. (day and night) . .	5 11 2	11 2 4	4 17 6	9 15 0
3	Do., special lanterns .	3 9 7	10 8 9	3 5 0	9 15 0
1	2 No. 4 burners . . .	7 7 9	7 7 9	5 2 0	5 2 0
4	3 Do.	8 17 4	35 9 4	7 0 0	28 0 0
2	3 5-ft. per hour burners .	10 7 0	20 14 0	9 15 0	19 10 0
1	"Horns"—lighting only —"Horns" pay for gas, &c.	0 15 0	0 15 0	0 15 0	0 15 0
	Totals . . .	..	£2264 6 0	..	£2140 16 2

Total reduction per annum, £123 9s. 10d.

The Council already have an agreement with the Gaslight and Coke Company as to the reduction of 1s. 6d. per lamp per annum on account of the use of the automatic lighting apparatus. This will expire on Feb. 8, 1914, after which a further reduction is contemplated if the use of the automatic apparatus is continued. It is suggested that the new agreement should expire on the same date as that relating to the automatic lighting agreement, in order that any rearrangement of prices may be made as from the date of the expiration of the two agreements. The revised prices stated above will be subject to fluctuation on an increase or reduction in the price of gas.

At the meeting of the Council last Thursday, the Committee recommended that the offer of the Gaslight and Coke Company should be accepted, and that an agreement on the basis named should be entered into for the period expiring on Feb. 8, 1914. This was agreed to.

The same Committee reported that in July last the Council accepted an offer from the South Metropolitan Gas Company to convert all the existing lamps fitted with No. 4 burners to the inverted pattern, at a charge of 3s. per lamp, subject to a reduction in the annual charges for maintenance. The Committee had received an offer from the Gaslight and Coke Company to convert certain lamps to the inverted system as follows:—

Kind of Lamp.	Charge per Annum.	Cost of Conversion.	Charge per Annum after Conversion.
One No. 4 burner . .	£2 18 0	.. 9s. 0d.	.. £2 15 0
Two No. 4 burners . .	5 2 0	.. 11 3	.. 4 18 3
Three ,, ,, . .	7 0 0	.. 11 3	.. 6 16 3

It will be seen from the above that the cost of conversion is equal to three years' saving on the reduced charges after conversion. The Company, however, had offered to bear the cost of the conversion if the Council would agree to pay for three years the charges that would be borne if the present burners were retained—the charges then to be reduced to the above-mentioned figures. The Committee recommended that the 255 lamps fitted with a single No. 4 burner, one lamp with two of these burners, and four lamps with three of them should be converted to the inverted incandescent system at the cost of the Gaslight and Coke Company, subject to the charges for the lamps being reduced as shown above at the end of three years. This was agreed to.

In a further report, the Committee stated that they had also had under consideration for some time the question of the conversion of the refuge lamps in the South Metropolitan Company's district to the inverted system. The present cost per annum of these was £182 11s. 8d.; and if the offer of the Company was accepted, the future cost would be £168 7s. 9d. By the Company's scheme, for an immediate expenditure of £18 3s. there would be a considerable increase in the illuminating power of the refuge lamps, with a reduction in cost of £14 3s. 11d. per annum. The Committee recommended that the Company's offer be accepted; and this was agreed to.

BRISTOL CORPORATION AND THE GAS COMPANY.

Withdrawal of Opposition to the Company's Bill.

At the Meeting of the Bristol Town Council last Tuesday, reference was made to the compromise which has been come to between the Corporation and the Gas Company, as the result of which, as mentioned in the "JOURNAL" last week, opposition to the Company's Bill will be withdrawn.

Alderman PEARSON, on behalf of the Parliamentary Bills Committee, said this was the first occasion on which they had ever had an opportunity of discussing with the Gas Company their proposals; and he thought the new departure was extremely useful, and would lead to good results. It was a testimony to the common sense of those who were responsible for the Bill, that they saw fit to consult the Committee on the subject. Both sides considered the matter with a straightforward desire to come to an agreement if they could, and to reconcile the differences which apparently existed between them. The result was that there would be no further expense incurred. As to the question of sulphur being eliminated, he might point out that this was not an impurity which it was worth while to go to great expense to get rid of; and the Committee gave way to the Company, as also on the question of 14-candle illuminating power gas. As to testing, they had accepted a modified proposal, which would appear in the Bill. He wished the Company had taken power to lay mains in streets not at present dedicated to public use; but they felt they had better not do this. The only objection the Committee had was that the Company proposed to lay pipes where they thought fit in such cases, while the Committee felt they ought to be put in subject to the supervision of the Corporation, so that when they took over the street they might not be in the position of having to move the pipes at their own expense.

He moved the adoption of the Committee's report.

Mr. ILES seconded the motion.

Mr. WHITEFIELD asked for information in regard to the clause as to referring the right of the Company to require consumers to execute repairs to pipes laid under the streets. He wished to know if it had been the law in the past for the tenant to be responsible for it; if not, it was a most serious thing for the inhabitants of the city, and a matter that should be very carefully looked into. If it had been the custom in the past, why did the Company wish to incorporate it in their Bill?

Alderman PEARSON replied that the original clause in the Bill would have made it compulsory on the consumer to make any necessary repairs between the main and the meter and the meter and the house; but the present arrangement was that the repairs would be apportioned. Time was when they were not allowed to have a meter in their own house; but now that it was brought into the house, it did not seem to him to be an injury to agree that the tenant should repair the pipe on his premises, but that when it was off it should be repaired by the Company. The private individual had no right to break up the highway and put the pipe in repair; so that it was clear with whom the duty should rest. The Committee did not think that the Company were acting at all unfairly in the matter.

The report was adopted.

MR. A. DOUGALL ON THE MANUFACTURE OF GAS.

At the Town Hall, Tunbridge Wells, on Monday evening last week, Mr. Andrew Dougall, M.Inst.C.E., the Engineer and General Manager of the Tunbridge Wells Gas Company, gave a lantern lecture before the members of the Tunbridge Wells Chamber of Commerce on "Coal Gas: Its History, Manufacture, and Uses." There was a large attendance. Mr. Dougall first traced the development of the gas industry from the early discoveries of more than a century ago, which proved the possibility of obtaining gas from coal for illuminating purposes, and then proceeded to describe in great detail, and by the aid of many illustrations, the methods employed to extract the gas, purify it, and collect the numerous, and in some cases valuable, residual products. The Bunsen burner and the Welsbach mantle were described; and tables showing the illuminating power obtained from various burners were quoted. Examples of public and shop lighting were exhibited; and the most economical methods of using gas-fires were explained. A series of slides furnished evidence of the substantial progress made in the gas industry during the past quarter-of-a-century.

As a concluding picture, Mr. Dougall showed a portrait of Alderman Delves, the Chairman of the Tunbridge Wells Gas Company, who is the only freeman of the borough. He said he ventured to think that among the many and varied services Mr. Delves had rendered to Tunbridge Wells none had been more generally useful than that of Director of the Gas Company—a position he had filled for more than fifty years; and it was largely to his business ability and keen perception that the price of gas had been brought down to the present moderate figure of 2s. 7d. per 1000 cubic feet, compared with 6s. 8d. formerly charged. In conclusion, Mr. Dougall said that what he thought was very striking in the progress of the gas industry during the half-century Alderman Delves had been on the Board of the Company was the fact that it had been possible to obtain 35 times more light for the same money now than was the case before. Surely this was a wonderful development for an industry.

GLASGOW GAS CONSOLIDATION BILL.

Observations on the Position.

At the Meeting of the Glasgow Town Council last Thursday, the decision of the House of Commons Committee on the above-named Bill, reported in our "Parliamentary Intelligence," was the subject of some remarks.

Mr. W. F. Anderson asked the Convener of the Parliamentary Bills Committee (Mr. J. Macfarlane) if they would afford the Council an opportunity of considering the effect of the decision before proceeding to the House of Lords. Mr. Macfarlane said he rose with some sense of responsibility to reply to the question. He felt that there was some feeling in the Council in regard to the success, or non-success, their efforts had met with in London. He might say that, so far as the Sub-Committee were concerned, he had received from each member the whole-hearted support he had expected; and in the course of the proceedings the Sub-Committee were absolutely unanimous. He could assure the Council that they were as disappointed as the members of the Corporation could be at the findings of the Committee. They considered the matter very carefully in all its details, and came to the conclusion in the meantime that they should proceed with the Bill. They were quite agreed that the matter should be laid, not only before the Parliamentary Bills Committee, but before the Gas Committee; and that the Corporation should have an opportunity of considering the matter very carefully.

In the Pollokshaws Town Council, on Thursday evening, the Town Clerk reported on the result of their opposition to the Bill, and said that if the measure had passed, the outside authorities would have been absolutely at the mercy of the Glasgow Corportion. Provost MacDougall said that if the opposition had achieved nothing else than the defeat of the proposal of the Corporation to apply the profits of the gas undertaking to the reduction of the city rates, it would have been worth all the trouble and expense. The Corporation now found that the outside authorities were determined to resist any encroachment by the city on their rights.

PROFITS AND THE RATES AT MANCHESTER.

When a proposal of the Electricity Committee of the Manchester Corporation to borrow £40,000 for extensions came before a special meeting of the City Council last Wednesday, Alderman Holt, the ex-Lord Mayor, raised an objection. He pointed out that the Corporation had spent about two millions sterling on the electricity undertaking, and submitted that it was about time they had some return from this department in aid of the rates. The Electricity Committee ought to be placed on the same footing as the other trading Committees. Their refusal to contribute to the rates placed the Gas Committee in a very unfair position. In his reply, Mr. Haworth, the Chairman of the Electricity Committee, argued that the department was not established for the making of large profits, but to supply current at the lowest possible price to citizens not in a position to provide for themselves. If they were to be compelled to pay over a given sum each year in relief of the rates, the operations of the Committee would be limited. There was no justification for the Gas Committee paying over £50,000 in aid of the rates. They ought, instead, to reduce the price of gas considerably—especially for stoves. The special charges for current required for power purposes were intended to attract all of the big works' owners possible within the city boundary, and to encourage firms to erect works in the city. Last year the Electricity Committee did allocate a sum of £12,000 out of profits in aid of the rates. Alderman Holt said his purpose had been served by the discussion; and he therefore withdrew his opposition. The minutes of the Electricity Committee were then confirmed.

It will be remembered that last year, after considerable pressure had been brought to bear, the Manchester Gas Committee agreed to increase their contribution to the rates to £60,000; but to do this, it was necessary to draw on the reserve fund of the department to the extent of £42,731, with the result that the fund was practically extinguished. Four years previousiy, the fund stood at £147,608. Though the Committees have not yet completed their estimates, there is sufficient evidence that the Council are faced with an increase in the rates. There is an impression that an advance of 2d. in the pound will be necessary.

COALITE MANUFACTURE AT HYTHE.

Serious Complaints of Nuisance.

At the last Monthly Meeting of the Committees of the Hythe Town Council, the subject of the nuisance arising from the manufacture of coalite in the borough was under discussion. The MAYOR (Mr. F. W. Butler) presided.

The TOWN CLERK (Mr. G. S. Wilks) reported that he had received a letter from the Secretary of the Coalite Company, stating that the letter sent by the Council on the 10th ult. would be placed before the Directors at their next meeting. It was added that steps were being taken to abate the nuisance complained of. The trouble was one which would take some time to remedy; but the Council could rest assured that everything possible would be done to put the matter right. He (the Town Clerk) replied to the letter, and again drew attention to the nuisance caused by the manufacture of coalite in the borough; reminding the Company that when the Directors met the members of the Council, it was stated that certain works were to be carried out to remedy the nuisance, which, however, was still unabated. He asked to be informed of the exact position. The Council were loth to indict the Company; but they could not allow the nuisance to exist. He wrote again on the 31st ult., asking if any steps were being taken in the matter, and again protesting against the nuisance; and he had received another letter stating that everything possible was being done to mitigate it. He had written asking them to state what steps were being taken, as he was sure he would be asked some questions by the Council on the matter; and he pointed out that the word "mitigate" was hardly applicable, as the nuisance must be abated altogether. The Council could take action against the Company, and apply for an injunction. He had been given to understand that the Company had manufactured enough coalite to last them through the summer months. This, however, was no answer to the complaints, as the nuisance might be created again in the autumn. He suggested that the Council should give the Borough Surveyor instructions to take notice of the nuisance from time to time. The Borough Surveyor had taken notes of the condition of the atmosphere, and also photographs of the steam and smoke coming from the works; and there was no doubt in his mind that they could prove their case right up to the hilt. They had ample evidence, assuming that they did eventually take proceedings against the Company; and he was sure they could obtain an injunction against them.

The MAYOR remarked that when the representatives of the Company saw the deputation from the Council in January, they stated that they were going to make an erection at the gas-works which would do away with the smell and also with the nuisance, so far as the quenching of the coalite was concerned. He understood that they would have some enclosed structure to prevent the steam coming out. However, there was no sign that it was being erected.

Mr. STRAHAN pointed out emphatically that the Council wanted an exact account of what the Company were doing. If the Council were satisfied that steps were being taken to abate the nuisance, they should have an explanatory letter from the Company, so that they might know whether the remedy would be sufficient. He moved that this course be adopted.

The TOWN CLERK stated that when he wrote to the Company on the 30th ult., he enclosed an objection signed by a number of householders and inhabitants of Hythe, calling attention to, and complaining of, the noxious fumes sent out from the gas-works from time to time. He pointed out that they were not residents in one particular neighbourhood, but in various parts of the town. Between 30 and 40 signed the objection.

Alderman JEAL said he thought the action the Council were taking was not strong enough. The Company still continued the nuisance, and it was one that they should take immediate steps to abate. He fully realized that this was a new industry in Hythe, and they did not want to put anything in the way of new industries; but if this was allowed to continue, they would have their lodging-house keepers ruined, He was in favour of the Council taking immediate proceedings to cause the Company to abate the nuisance, or get rid of the manufacture of coalite altogether from Hythe. Personally, he saw no advantage from it. They were having as much as 700 tons of coal a week brought into Hythe. There was the extra cartage on the roads, and the stuff was afterwards sent away, and they derived no benefit whatever from it. He failed to see why they should put up with a nuisance, when they had a memorial from the inhabitants, who would back them up in whatever action they took to abate it forthwith.

Mr. TUNBRIDGE, while agreeing with the previous speaker, pointed out that as much as £100 a week was being paid in wages, and that therefore a large number of the poorer ratepayers derived a benefit from the new industry. He suggested that the Council should give the Coalite Company reasonable liberty, and not to go to law if they could possibly avoid it. The Company should be asked whether they were prepared not to make any more coalite till the end of September; and meanwhile they should take such action as would mitigate the nuisance. The Council were only acting on behalf of the ratepayers; and the Company must not run away with the idea that they were trying to get rid of the industry. They would try to keep it if they could get rid of the nuisance attending it.

Alderman SCOTT then seconded Mr. Strahan's proposition.

The MAYOR remarked that the Council were quite justified in asking the Company not to make any more coalite between now and the end of September, as this would give them six months in which to take the necessary steps to get rid of the nuisance.

The proposition was then carried unanimously; and the Borough Surveyor was instructed to continue to take notes with regard to the nuisance.

SOUTH BARRACAS (BUENOS AYRES) GAS COMPANY.

The Twentieth Ordinary General Meeting of the Company was held last Thursday, at the London Offices, No. 1, East India Avenue, Leadenhall Street, E.C.—Mr. J. C. IM THURN in the chair.

The SECRETARY (Mr. W. Upton) read the notice convening the meeting and the Auditor's certificate; and the report and accounts for the year to Dec. 31 last were taken as read.

The CHAIRMAN remarked that he was sure the shareholders would agree with him that the balance-sheet and revenue account for the twelve months were satisfactory. During the past year, the works had been maintained in efficient condition; and propaganda had been carried out energetically in the districts served by the Company, with successful results. Good progress had been made in all branches of the Company's business—especially in the installation of gas for public lighting. As the proprietors were aware, the three Gas Companies in Buenos Ayres had amalgamated. This had affected their undertaking to the extent of the gas which, for mutual convenience, they had been supplying to the Buenos Ayres (New) Gas Company for consumption in the city. Owing to this, and to expense incurred in opening new show-rooms and offices in Banfield, and the creation of a new staff, the result of the year's trading was somewhat less than that for 1908—being £9441 (including suspense account). This, together with £5243, profit other than trading, and £3904 brought forward from the previous year, made an available total of £18,588. After placing £5000 to the reserve fund, the Directors recommended a dividend at the rate of 5 per cent. per annum, free of income-tax, absorbing £7500, and carrying

forward £6088, which was a good increase over the carry-forward of the previous year. The profits other than trading had been chiefly derived from the sale of shares of the Province of Buenos Ayres Water-works (Construction) Syndicate, Limited; and as this profit was non-recurrent, the Directors had thought it well to create a reserve fund of £5000, which would help to consolidate the position of the Company now that it was separated from its former relationship with the Buenos Ayres (New) Gas Company. In order to settle outstanding matters of account with the latter Company for advances to the South Barracas Company in respect of extensions, a loan was secured from the bankers by the creation of a mortgage debenture. The Directors had paid off £10,000 of the original loan of £50,000; leaving £40,000 outstanding. The work of the Province of Buenos Ayres Water-Works (Construction) Syndicate had been rapidly pressed forward during the past year, and one section was within measurable distance of completion. Towards the end of this year, the whole of the work was expected to be finished. The Directors anticipated that completing this important work would have a most beneficial effect upon the prosperity of the districts served by the South Barracas Company; for the great drawback of this valuable residential and industrial part of Buenos Ayres had been the want of a proper water supply. On Feb. 24 last, an extraordinary general meeting of the Company was held at which special resolutions were passed—(1) Subdividing the 15,000 issued shares of £10 each into 150,000 shares of £1 each, (2) subdividing the 5000 unissued shares of £10 each into 50,000 shares of £1 each, and (3) increasing the capital of the Company to £300,000 by the creation of 100,000 additional shares of £1 each. These resolutions were subsequently confirmed. The reason which led the Directors to decide upon reducing the shares of £10 to an equivalent value in £1 shares, was the very large amount of fractions which would have been left over upon the division of the capital of the Company among the shareholders of the Buenos Ayres (New) Gas Company, which would have resulted in a very large number of shares having to be withheld from the shareholders in order to provide, by their sale, the amount of money required by these fractions, which had to be paid in cash. The conversion to a £1 share would result in the number of shares requiring to be sold being kept well within reasonable limits. In addition, the Directors thought it would also be a more convenient unit in practical working. It was the intention of the Board, at an early date, to offer the shareholders the prior right to the proposed further issue of capital required for paying off the loan from the bankers and for providing for the further extensions which it was anticipated would soon be necessitated by the increase in the number of houses in the progressive districts served by the Company. He had pleasure in stating that Mr. J. M. Macmorran, who for many years held the position as Secretary to the Company, had joined the Board. Mr. W. Upton had been appointed Secretary in his place. He concluded by proposing the adoption of the report and accounts.

The motion was seconded by Mr. Ross Pinsent, and unanimously passed without discussion.

The subsequent proceedings consisted of the declaration of the dividend recommended (5 per cent., free of income-tax), the re-election of the retiring Directors and the Auditor, and an acknowledgment of the excellent work done by the staff, both at home and in South Barracas.

GAS SUPPLY IN SHANGHAI.

The Annual Meeting of the Shanghai Gas Company, Limited, was held on the 23rd ult.—Mr. E. Jenner Hogg in the chair.

The Secretary (Mr. G. R. Wingrove) having read the notice convening the meeting, the report and accounts for the year ended Dec. 31 last, were presented. The former set forth that the business of the Company continued to be satisfactory, and that the profit on the year's working amounted to 249,882 taels; being an increase of 8689 taels compared with the preceding year. The net profit was 232,059 taels, or 12,897 taels more than before. The balance at the credit of the profit and loss account, after crediting the account with 4306 taels brought forward, and deducting 4000 taels bonus paid to the foreign staff and the interim dividend, was 160,366 taels, which the Directors recommended should be appropriated as follows: Final dividend (making 13 per cent. for the year), 84,000 taels; and allowance for depreciation, 71,657 taels—leaving 4709 taels to be carried forward.

Appended to the Directors' report was one by the Engineer (Mr. H. King Hiller) which furnished the following particulars: Coal carbonized, 44,494 tons; gas made, 521,936,100 cubic feet, or 11,730 cubic feet per ton; gas sold, 483,658,400 cubic feet; used at works, unaccounted for, and in stock, 38,277,700 cubic feet; unaccounted for in distribution, 5·48 per cent.; length of mains laid during the year, 7950 yards; approximate total length of mains, 88·88 miles. The gas sold was divided as follows: Private consumption, 472,764,900 cubic feet; public lighting, 10,893,500 cubic feet.

The Chairman, in moving the adoption of the report, said he felt sure the shareholders would be well pleased with it and the accounts, showing as they did such satisfactory results through a continued period of bad times. There had been several hindrances during the year to the extension of the consumption. The bad times enjoined economy on the part of consumers—the closing of opium shops had had its effect; and they had lost some public lighting—not always, he thought, to the advantage of the public. It must also be borne in mind that the extended use of improved and more economical gas lighting appliances, while benefiting consumers, tended to reduce the quantity of gas they individually consumed. This, however, the Company welcomed, since the cheaper their methods were, the better it was for them ultimately, as the facts became more clearly understood. Though the output of gas for 1909 was rather less than in 1908, the actual number of their customers had increased; and a very satisfactory feature was that they had a large proportion of new consumers of gas for heating and cooking purposes. Turning to the accounts, the receipts had been 693,440 taels, against 666,719 taels, or an increase of 26,721 taels, while the total expenditure had been 443,557 taels, against 425,526 taels—an increase of 18,031 taels, due chiefly to the high cost of carbonizing material. Purifying had cost rather more than before. The manufacturing and maintenance expenditures showed slight increases; but the cost of manufacture was lower, partly due to salaries and wages being less, and also to a very satisfactory economy in labour. The general expenditure on distribution had only increased in proportion to the enlarged area of the Company's distributing system. The balance of profit available for appropriation was, as shown in the report, 160,366 taels. Passing on to refer to the controversy with the Council concerning the Canton Road mains, the Chairman said it was satisfactory that it had been closed. It was one that he regretted to have had forced upon the Company. There was, however, really nothing for the Directors to do, in justice to the shareholders, but to claim their rights, which had been entirely upheld throughout by the Courts and the arbitrations. The matter was twice before the Court of Consuls and twice before the Arbitrator. The terms of settlement were contained in correspondence which had been printed and circulated to shareholders for their convenience.* He wished he could say that they had received from the Council the equality of treatment in regard to public lighting that they were led to expect, and to which their ability to light economically and their contribution to the municipal funds should entitle them. They found themselves sometimes misrepresented; and when occasion arose, during the last year, they laid before the Council at some length certain facts showing the advantage to be derived from the improved systems of gas lighting, and they demonstrated their economy for the ratepayers. The Council's rejoinders could hardly be considered convincing. There was a ray of hope, however, in their last letter, wherein they informed the Directors that, though the lighting arrangements were at the time so complete that nothing could be done during 1909, yet that the whole of their representations would be taken into consideration in framing proposals for 1910. They would try to look forward with some confidence to see what came of this, and hoped that it opened to the Company the "fair field and no favour" which he had so frequently claimed. Having referred at some length to the remarks of Mr. Corbet Woodall, on municipal competition, at the last meeting of the Gaslight and Coke Company, which he said were applicable to the Shanghai Company, the Chairman passed on to allude to the future. In regard to this, he thought he might speak with considerable confidence, as there was every reason to look for an extension of their business. He did not think either the shareholder or the public were alive to the enormous improvements which have taken place in the methods of lighting, heating, and cooking. After citing some instances of the applicability and convenience of gas, the Chairman concluded by saying that those who were familiar with the history of the Company forty-six years ago would remember that the policy had been followed of including the public in a participation of the prosperity of the undertaking by reducing the price of gas as occasion offered, until the present charges compared more than favourably with those in force in most towns of similar size to Shanghai in England and the Colonies, and also on the continents of Europe and America. He added that he could not close without speaking in terms of high appreciation of the staff, on whose systematic, zealous, and scientifically progressive work the success of the undertaking so much necessarily depended. He knew the Company might rely upon the continuance of such work; and he therefore asked the sanction of the proprietors to the Directors making some recognition of this in the shape of a bonus, which he thought might be 5 per cent. on the salaries of the staff.

Mr. J. M. Young seconded the motion, and it was carried unanimously.

A final dividend at the rate of 3½ taels per share was then declared for the past year; and the retiring Director and Auditors having been re-elected, the proceedings closed.

* This matter was noticed in the "Journal" for April 6, 1909 (p. 44), —Ed. J.G.L.

LABOUR CO-PARTNERSHIP ASSOCIATION.

Progress of the Movement.—Views of Mr. Corbet Woodall.

The Annual Meeting of the Labour Co-Partnership Association was, by permission of the Lord Mayor of London, held in the Mansion House last Friday afternoon. The chair was taken by Mr. Aneurin Williams, M.P. (the Hon. Treasurer), in the unavoidable absence of Mr. D. J. Shackleton, M.P., the President for the year. It may be remarked that the object of the Association is to bring about an organization of industry based on the principle of Labour Co-Partnership—that is to say, a system in which all those engaged shall share in the profits, capital, control, and responsibility. With this view, it seeks (1) in the co-operative movement to aid by its propaganda and advice all forms of production based on the above principle; and (2) in other businesses to induce employers and employed to adopt schemes of profit-sharing and investment tending in the same direction.

The Report of the Committee.

In the course of their twenty-fourth report, the Committee made the following interesting remarks with regard to the progress of co-partnership in the gas industry: "The increase in the number of gas companies practising co-partnership principles is a striking one; and it is noteworthy that the largest and the first British Gas Company—viz., the Gaslight and Coke—which was established in 1809, is included in the list. Twenty companies administering £43,675,811, being over one-half of the total capital employed in this industry, apart from municipal undertakings, are now working on the co-partnership principle. One interesting feature is the obviously growing confidence of the employees of gas companies in the opportunity that these schemes offer for investment of their savings. In the case of the pioneer Co-Partnership Gas Company (the South Metropolitan), considerable difficulty was experienced in the early days in getting many of the employees to take advantage of the facilities offered for the investment of their share of profits. It will be seen that, so far from this being the case now, the employees, as regards practically all the later schemes, have more invested in one form or another than has been credited to them as dividend on their wages. It is evident that co-partnership has at last 'caught on' in the gas industry. Many persons of a sceptical turn of mind prophesied that when the personality of Sir George Livesey was

withdrawn, the whole thing would decline. Instead of this being the case, we see that his example is becoming more fruitful as time rolls on; and it seems to be quite within the range of possibility that before very long we may be able to record the conversion of practically a whole industry to the adoption of co-partnership principles. It is difficult to believe that the remarkable progress in this direction will be without influence on other industries in the country. It may be said that the conditions are peculiarly favourable in the gas industry, and this is no doubt true; but we are convinced that, if employers can be found in other industries who will apply themselves with the same public spirit and determination to discovering the best method and working the same out as Sir George Livesey did, co-partnership will be adaptable on a large scale to many other occupations and industries than that of gas making."

A Letter from the President.

Mr. Shackleton expressed regret at his compulsory absence, in a long letter which was read by the Secretary (Mr. Henry Vivian, M.P.). Proceeding to deal with the work of the Association, he said, in the course of his remarks, that it appeared to him there were three essential and most desirable results to be achieved from the application of the principle of co-partnership—(1) A better understanding between employer and employed; (2) an educational opportunity which must tend to a clearer view of the relationship between Capital and Labour; and (3) a personal interest in the daily work of the employee which would tend to remove the monotony and tediousness of the average life of a machine worker. As regarded the first of these results (and in his view the most important), nothing but a closer relationship would break down the present barrier, and lead to a higher conception of each other's duties. An improvement had taken place of recent years, which had led to Arbitration Courts, Conciliation Boards, and Joint Boards between the two sides of industrial life. The action of the Board of Trade in this connection could not be too highly appreciated. The less there was of compulsion in these methods, the better. Co-partnership, if properly worked, avoided almost entirely trade disputes. The workmen were generally represented on the Committee of Management. They knew all the details of their trade, and would in consequence appreciate and meet the difficulties of the situation. Any scheme of co-partnership or profit-sharing which made it a condition that the men must forego their right to collective bargaining—the right to use the weapon of strike, not to mention leaving their Trade Union—would receive the strongest opposition of the whole Trade Union world, for one very elementary reason—viz., that for many years to come the ordinary industrial method of carrying on business by the employer and employee would continue. To secure continued improvement in the standard of living and the various legislative reforms which affected the industrial classes would require the united service of every worker. His own view was that far too many trade troubles were due to mutual ignorance; but with a proper application of the principle of co-partnership, this could not exist. He looked to the personal interest in their work which co-partnership would give to employees as one step, and not an unimportant one. He could not close without a word of congratulation on the splendid progress made by the housing side of the co-partnership movement. The Co-partnership Housing Societies looked like making a real and very substantial contribution towards the solution of many problems connected with home life.

PROGRESS OF CO-PARTNERSHIP.

Mr. L. W. Simpson Rostron then read a paper on this subject, in the course of which he said:

I understand the principle of co-partnership to be that it is desirable for men employed in an industry to have, in addition to their wages, some share in the profits, some interest in the capital, and, where possible, some voice in the management of the business in which they are employed.

The advocates of co-partnership believe: (1) That the average man will do better work if he has an interest in the results of his labour than if he is a mere wage earner. (2) That he will take more interest in his work, and a wider view of the requirements of the industry in which he is employed, if he has some permanent interest in it. (3) That a system of giving employees a share in the profits and the investment by them of such profits in the employer's business is the most natural and equitable means of remedying the property-less condition of the working classes. (4) That a man who works his best, takes an intelligent interest in his work, and has some property of his own, is not only a more efficient producer, but a happier man and a better citizen.

Co-partnership, in my view, is advantageous to everybody. It does good to the employee by giving him a share in profits, an opportunity for saving and safely investing his savings, a greater interest in his work, and more knowledge and experience of business; it gives the employer a more efficient and more contented body of men, and more knowledge and experience of their point of view; and it gives to the nation the increased political and commercial stability and prosperity which must arise from the growing-up of greater industry, efficiency, and contentment, and the wider distribution of property among its citizens.

It may fairly be contended, therefore, that a system which tends to diminish friction between capital and labour and to create mutual confidence and sympathy between them, which tends to increase the industrial efficiency—which must always be, whatever our fiscal system, our main safeguard against foreign competition—and which makes it easier for the working classes to acquire property, is entitled to a high place among schemes of social reform, especially when we reflect that, unlike some other schemes of social reform, it does not involve additional taxation, any interference with personal liberty, or the appointment of one single additional public official. I do not think, therefore, that I need take up any further time in dilating on the merits of the principle of co-partnership; I am sure that we all agree about them. The only possible question can be: Is it practicable? And the object of this paper is to show that it is practicable, and capable of enormous extension, by giving instances of various businesses in different parts of the country where the system has been adopted and is in successful operation. These practical examples of co-partnership may be divided into three classes: (1) Businesses formed by societies of workmen on complete co-partnership principles; (2) regular businesses formed in the ordinary way which have adopted in a greater or less degree co-partnership principles; and (3) the co-partnership housing movement.

The author then proceeded to cite instances of co-partnership productive societies, and stated that at the end of 1908 there were altogether 112 in this country, with an aggregate capital of £1,941,112. The amount of trade was £4,214,542; the profit (including interest on shares, but not on loans), £182,663; the loss, £7607; and the dividend to labour, £24,262.

Dealing next with joint-stock companies who have adopted co-partnership principles, Mr. Rostron pointed out that the largest group is composed of gas companies; 23 of them, with an aggregate capital of upwards of £43,000,000, and employing more than 20,000 men, having up to the present time adopted co-partnership schemes. The following is a list of these Companies: Bournemouth, Cambridge, Cardiff, Chester, Commercial (London), Croydon, Dartford, Enfield, Gaslight and Coke (London), Gloucester, Grantham, Ilford, Leamington, Newport, Rugby, South Metropolitan (London), South Suburban (London), Tottenham and Edmonton, Tunbridge Wells, Walker and Wallsend, Watford, Wellingborough, and Wrexham. The author explained that the pioneer in this movement was the South Metropolitan Gas Company; and as their scheme had been tested by twenty years' experience, and formed the model on which the schemes of the other companies were based, he thought it would be of interest to give its history and indicate its main features. This he did in some detail, and then reproduced the table giving statistical particulars in regard to co-partnership and profit-sharing in British Gas Companies which appeared in the "Journal" for the 11th of January last (p. 113). This table, it may be remembered, showed that the twenty Companies mentioned divided £93,679 in the course of last year among their employees, who on Dec. 31 held in the respective undertakings, shares and deposits of the market value of about £528,843. Mr. Rostron mentioned that since the table was compiled, the Cambridge, Enfield, and Ilford Gas Companies had adopted co-partnership schemes; and that considerable further quantities of stock, amounting in the case of the Gaslight and Coke Company alone, to £32,200 nominal value, had been acquired by, or on account of, the employees.

The author then gave examples of the adoption of co-partnership schemes in other businesses. Referring to the one introduced at the beginning of last year by Sir Christopher Furness to his shipbuilding employees at Hartlepool, he explained that special employees' shares were created which were entitled to interest at 4 per cent., and also to share rateably in any surplus profits after 5 per cent. interest had been paid on the capital of the Company; and the men agreed that these new shares should be paid up by deductions up to 5 per cent. from their wages. Unfortunately, however, in spite of the successful working of the scheme, the men had, so far, declined to renew it for another year. Mr. Rostron expressed the hope that some means of overcoming the difficulties in the way of renewal might be found. He said his list of co-partnership businesses, which did not profess to be in any way exhaustive, at all events showed that the principle had been adopted in one form or another in some of the leading industrial undertakings in the country, by some of the ablest men of business, and in industries so widely different as gas, woollen, jam, building, soap, and shipbuilding. He considered it justified the conclusion that the system is a practical one, and capable of wide extension, if only employers of labour as a body will take it up, and adopt the principle whenever and wherever they find it practicable to do so.

The concluding portion of the paper was devoted to the co-partnership housing movement, which Mr. Rostron said was spreading by leaps and bounds. In bringing it to a close, he expressed the hope that he had put before his audience sufficient facts to justify the claim he made at the outset, that co-partnership was not only right in theory, but sound and successful in practice. The whole history of the growth of the movement was, he said, a most cheering thing at a time when matters were not very cheerful, because it showed that there is a solution for some of the chief difficulties which arise between capital and labour, that there are employers able to apply it, and that the working classes will respond if approached by the right people in the right way.

A Discussion.

Mr. T. C. Taylor, M.P. (speaking as one who had turned his business into a limited liability company for the purpose of giving his men a share in the capital) remarked that he believed the essential feature of profit sharing was that the capitalist should pay over part of the profits he obtained as capitalist to the workers as workers, independent of any conditions. The splendid scheme of the South Metropolitan Gas Company, with which was associated the name of Sir George Livesey (never to be forgotten), had been developed, and one of the steps had been to associate in the management elected employees. He himself hoped some day not only to give profits to his own men, as at present, but to transfer the management of the business to the workers themselves.

The Chairman said he would now call upon Mr. Corbet Woodall, the Governor of the Gaslight and Coke Company, and President-Elect of the Association, to move a resolution.

Mr. Corbet Woodall said the resolution that he had the honour to propose was: "That this meeting tenders its hearty thanks to Mr. Shackleton for his letter, and expresses its deep sense of the value of the principle of co-partnership as a means of promoting industrial peace, progress, and efficiency." He was sure they were all deeply indebted to Mr. Shackleton for his very wise and sympathetic letter; and he thought those who had heard it read must have had their regret increased at his absence from the meeting. Before making any remarks in support of the resolution, he (the speaker) would like to say how glad he was to be at this interesting meeting, to help carry on the work initiated, so far as the industry with which he was identified was concerned, by his late friend Sir George Livesey. Sir George was a very lovable man; and one did not wonder at it, because of the sympathy he had, not only with those of his own class, but with all those who were associated with him in the work in which he was engaged. With reference to co-partnership, he (Mr. Corbet Woodall) did not think that the principle of co-partnery as applied to the remuneration of labour stood in need to-day either of explanation or of

recommendation. What was wanted was earnest and sympathetic study of the best examples, and patient investigation of the failures—coupled with willingness to give any warrantable scheme a fair trial. It was difficult to interest the right people in these things; while the wrong people had only too much say about the designs of employers. It must not be forgotten that the efforts and intentions of co-partnery organizers were met with strong dislike, if not with overt opposition, by some representatives of working-class organizations; and that those persons would not be easily converted. Those whose purpose was to help the wage-earning class to become owners of property, must remain content to bear opprobrium from "a sort of" Socialist. Co-partnery, like most things in the world, was always upon trial; but there were enough successful examples of schemes in operation to make out a case for more. He confessed that he had not much patience with imaginary *a priori* criticisms of the principle, such as one who had put his hand to this plough was occasionally bombarded with by persons standing by, with their hands, so to speak, in their pockets—usually filled by somebody else. They were told that the amount of the partnership share of an industrial undertaking which could be spared for this purpose was too small to have any effect upon the *morale* of the recipients, and that therefore it was as good as thrown away—if, as they understood it, the idea was that the grant should come back again in the form of increased interest on the part of the beneficiaries. The answer to this criticism was that the amount, though small in the eyes of a capitalist, was by no means insignificant to the day-worker, who under the ordinary wage-system often never got half-a-crown ahead of the world from beginning to end of his career. He felt already that the amount he might save by going without things he liked was too small to be worth the sacrifice. He was wrong, as there was any amount of proof to show. But the difficulty lay in helping him up the first step. This was the justification for the regulation, so often questioned in co-partnery schemes, that a proportion of the payment must not be withdrawn. They were sometimes asked, not for information, but as a taunt, how a share in a business could belong to a man if he must not deal with it as he would like. One answer was that this was by no means the only kind of property that was owned and enjoyed, but could not be sold away. In point of fact, however small the allocation of profit from his employment to a workman, it mounted up very remarkably in the course of years. Meanwhile, its influence upon the man, and also upon his circle, was positive on the side of respectability and self-respect. The man was a citizen, with the sense of responsibility greatly increased. Let them be fair to the workman, even when his weaknesses appeared to be beyond the reach of sympathy. They should remember his limited horizon, his often monotonous toil when in work, and his helplessness when unemployed for ever so short a period. He drank and betted because he was a man, not an animal content to feed in a stall. Let them give him other interests, a new and brighter outlook towards old age, and much of good would follow. This change of the status of the wage-earner must come from above, if he might so qualify the source of the wages, and could never be appropriated on their own motion by the workpeople. It was therefore condemned out of hand by those, mostly interested persons, who desired to keep the workman apart from the rest of the community, in a class of his own. These Particularists objected to co-partnery root and branch—not, like the theorists already mentioned, on account of the smallness of the interest it conveyed, but because this was enough to leaven the whole lump of working-class aspirations. He was not an enemy of Trade Unions, as means for the mutual protection and assistance of workmen. Far from it. He thought such societies competent to effect great good in the world. But he did not hold himself bound to accept whatever might be put forward by individuals as the true voice of Trade Unionism. There were more ways than one of improving the living conditions of any class of the community; but he believed that all must have the common impulse of individual striving after the better thing. They did not pretend to reform mankind from outside, but to open the road for a man to enter into a larger citizenhood, if he would take it. The element of co-operation must be there; for which reason they adhered to their point of initial selection. Men ought to offer some promise of having a root of fidelity and thrift in them before they were admitted into an honourable partnership with their employers and companions. The advocates of co-partnership had set their hands to cut a long furrow across the accumulated prejudices, indifferences, and misunderstandings of time immemorial. They were bent upon regaining, or rather upon creating, the personal good-will of those whom they employed in their concerns in and towards their interest; and this could best be done by sharing it with them. It was not philanthropy, but common sense. It was not their fault that outsiders condemned their proceedings. They must hold on their way according to their lights, undaunted by prophecies of failure which, in the face of accomplished facts, sounded more impudent than terrible. A good co-partnership system was self-acting, and not the least of the incidental benefits derivable from it was the mutual enlightenment and improved understanding which flowed from the exercise of the continuous supervisory arrangements, in which all grades of the fellowship participated. It widened men's views, both of what was good for themselves and for their associates. It was not putting it too high to claim for it in operation the furtherance of the saving idea of "neighbourhood," and the consequent repression of the evil of class selfishness, which was an ill weed that flourished only too readily in all grades of the social system. It helped men to realize that they did not labour for themselves solely, but that their well-being was the result of reflection from the general prosperity. This was why, mainly, he was a convinced co-partner; and in this faith he hoped still to continue, even though progress were less rapid in the future than present indications encouraged them to hope.

Professor A. W. KIRKALDY, of Birmingham University, remarked that it was difficult to obtain statistics; but he had been assured that in this country at the present time profit-sharing was practised to an extent that very few people realized. Co-partnership had come to stay.

The discussion was continued by Mr. H. DANIELS and Mr. F. MADDISON. The latter speaker said he had been specially struck with the remarks of Mr. Corbet Woodall, because he had approached the question from the point of view of a business man possessing imagination, and realizing that, if businesses were merely run for profit, without any concern for the employees, they were not the best businesses. The labour co-partnership principle brought into businesses the thought of possession; and this materialized, and became possession.

The resolution was carried unanimously; and the proceedings closed with votes of thanks to the Lord Mayor for permitting the meeting to take place in the Mansion House, and to the Chairman for presiding.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 163.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord.	85–87*	+1	5 14 11
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	Oct. 28	7†	Bombay, Ltd.	6⅞–6⅞	..	5 5 8
40,000	5	,,	7†	Do. New, £4 paid	5–5⅛	..	5 6 8
50,000	10	Feb. 25	15	Bournemouth Gas & Water: 10 p.c.	29–30	..	5 0 0
311,810	10	,,	7	Bournemouth Gas & Water: B 7 p.c.	16¼–16⅝	..	4 3 7
75,000	10	,,	6	Bournemouth Gas & Water: Pref. 6 p.c.	15–15½	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	251–254	..	4 18 5
300,000	,,	,,	9¾	Do. New	188–190	..	5 0 0
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	101–103	..	3 17 8
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	213–216	..	5 1 0
246,320	,,	,,	8	Do. A Ord. Stk.	152–155	..	5 3 3
460,000	20	Apl. 1	10⅝	British	44–45*	..	4 14 8
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	116–118	..	5 1 8
165,700	,,	,,	4⅜	Do. B 3½ p.c.	87–89	..	5 1 2
82,278	,,	,,	5⅜	Do. C 5 p.c.	104–106	..	5 3 9
51,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	87–89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	—	..	—
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6–7	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	49½–50½	+½	5 18 10
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	86–88	..	5 2 3
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	106–108	..	4 12 7
1,513,380	Stk.	Feb. 25	5⅝	Commercial 4 p.c. Stk.	106–108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800,000	Stk.	Dec. 10	5	Continental Union, Ltd.	98–100	..	5 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–140	..	5 0 0
492,270	Stk.	—	5½	Derby Con. Stk.	121–123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	104–105	..	3 16 2
148,995	,,	Apl. 1	5	East Hull 5 p.c. Ord.	96–98*	..	5 2 0
486,090	10	Jan. 27	12	European, Ltd.	24½–25	..	4 16 0
354,060	10	,,	12	Do. £7 10s. paid.	18½–19	..	4 14 9
16,198,673	Stk.	Feb. 10	4⅝	Gas light and Coke: 4 p.c. Ord.	104–105	+½	4 8 10
2,600,000	,,	,,	3⅛	Gas light and Coke: 3½ p.c. max.	88–90	..	3 17 9
4,062,235	,,	,,	4	Gas light and Coke: 4 p.c. Con. Pref.	104–106	..	3 15 6
4,531,706	,,	Dec. 29	3	Gas light and Coke: 3 p.c. Con. Deb.	81–83	..	3 12 3
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93–95	..	5 5 3
82,500	,,	,,	6⅔	Do. do. 5 p.c.	117–119	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.	17⅛–18	..	6 2 3
131,000	Stk.	Mar. 16	7	Ilford A and C	145–147	..	4 15 3
65,780	,,	,,	5⅓	Do. B	108–110	..	5 0 0
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
4,940,000	Stk.	Nov. 11	8	Imperial Continental	181–183	..	4 7 5
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	122–124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A.	222–224	..	4 9 3
718,100	,,	,,	7	Do. B	163¼–165½	..	4 4 7
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103–105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean.	4⅜–5	..	6 0 0
560,000	100	Apl. 1	5	Met. of Melbourne: 5 p.c. Deb.	100–102*	..	4 18 0
250,000	100	,,	4½	Melbourne: 4½ p.c. Deb.	100–102*	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12⅜–13½	..	5 5 8
1,775,892	Stk.	Feb. 25	4⅜	Newc'tle & G'tesh'd Con	104–105	..	4 3 4
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	13½–13⅝	..	5 1 10
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	141–143	..	5 11 11
60,000	5	Apl. 1	8	Ottoman, Ltd.	6–6⅛*	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	134–136	..	5 1 0
60,000	50	,,	13	Do. B.	126–128	..	5 1 7
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Oct. 28	7	Primitiva Ord.	7½–8	..	4 7 6
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅝–5⅞	..	4 8 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
1,000,000	10	Oct. 14	8	River Plate Ord.	—	..	—
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
250,000	10	Apl. 1	9	San Paulo, Ltd.	15½–15⅝*	+⅛	5 14 3
62,500	10	,,	6	Do. 6 p.c. Pref.	11½–12*	..	5 0 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	5′½–51½	..	4 17 1
135,000	Stk.	Mch. 16	10	Sheffield A	232–234	..	4 5 5
209,984	,,	,,	10	Do. B	232–234	..	4 5 5
523,500	,,	,,	10	Do. C	232–234	..	4 5 5
70,000	10	Oct. 14	10	South African	12½–12⅝	..	7 16 11
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120–122	..	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	81–83	..	3 12 3
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157–158	..	5 1 3
605,000	Stk.	Feb. 25	5⅝	S'th Suburb'n Ord. 5 p.c.	121–123	..	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	+1	4 1 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122–124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6⅔	Tottenham and Edmonton: A 5 p.c.	133–135	..	5 1 9
453,940	,,	,,	5⅜	Tottenham and Edmonton: B 3½ p.c.	113–115	+1	4 13 6
149,470	,,	Dec. 29	4	Edmonton: 4 p.c. Deb.	99–101	..	3 19 3
182,380	10	Dec. 29	8	Tuscan, Ltd.	9¼–9⅝	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	112–114	..	4 7 9
255,636	Stk.	Feb. 25	6⅝	Wandsworth: B 3½ p.c.	139–141	..	4 14 0
79,416	,,	Dec. 29	3	Wandsworth: 3 p.c. Deb. Stk.	74–76	..	3 18 11

Prices marked * are "Ex div." † Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The poor success which the Corporation of Glasgow have met with in their legislative proposals is being much discussed in gas circles. Subject to any reflections which there may be on the composition of the House of Commons Committee, as to which I am not in a position to form an opinion, I suppose that the Bill has been wrecked—as it virtually has been—upon the question of the annexation of outlying areas. The motto of the Glasgow Corporation includes the expression "Let Glasgow Flourish;" and to these words a section of the Corporation seem to be anxious to add "and no other place." At all events, the proposals in the Bill under consideration were so drawn as to make it desirable to be inside and undesirable to be outside Glasgow. This is the policy of the Corporation upon other questions. In the Tramways Department, the Corporation have endeavoured to woo outside localities by giving facilities for travel, and have declined to allow outside authorities to run cars of theirs into the city. This means that all tramway profits are to belong to Glasgow; and if outsiders wish to share in the profits, let them come inside. It has been the same with the Gas Bill; and the Parliamentary Committee have not sanctioned the proposals of the Corporation. Their decision may be interpreted as meaning that if annexation is proposed, it must come up for consideration without prejudice to either of the parties. There is, it must be admitted, the other side to the question—viz., that around Glasgow there is a cluster of smaller corporations and authorities who derive great benefit by their contiguity to the great city, but do not see their way to come in. I think it may be accepted that it would be better for all parties that the outside places should come in. But this is not their opinion, except upon terms; and the decision of the House of Commons Committee will have the effect of preventing the Corporation having the power to dictate terms in the important matter of gas supply. It will be a pity if, in their eagerness to secure annexation, the power of the Gas Committee should be so curtailed as to prejudice the supply of gas, which there is every appearance will be the case when comparison is made with other places where powers are possessed that have been denied to Glasgow, and also when compared with the powers conferred upon the rival Electricity Department. The decision has been a great disappointment to the members of the Corporation, who, it will be seen from a report of the remarks made at the meeting of the Town Council on Thursday [see *ante*, p. 196], do not yet know what their course of action will be.

The Edinburgh and Leith Gas Commissioners on Monday accepted tenders for 200,000 tons of coal for the forthcoming year. In intimating this decision (which had been arrived at in private) Judge Bryson, of Leith, the Convener of the Works Committee, stated that they had accepted, in almost every case, the lowest that had been put before them, and that there were good reasons for not accepting some of the tenders that were lowest. The prices are from 6d. to 9d. per ton higher than those of last year.

Out of the 113 applications for the post of Treasurer to the Edinburgh and Leith Gas Commission, the Special Committee appointed for the purpose first reduced the list to 19, and then to 10. These latter are to be interviewed by the Committee; and the appointment will be made on an early date.

A recommendation by the Gas Committee to contribute five guineas to the William Young Memorial Fund came before the Dunfermline Town Council on Monday. After a discussion, the recommendation was adopted by 17 votes to 4.

The unbusinesslike way in which corporations conduct their affairs is notorious. A most conspicuous instance of this occurred in the Town Council of Edinburgh on Wednesday, when the Cleaning and Lighting and Electric Lighting Committees recommended that the common stairs in the central part of the city should be lighted by electricity. It was explained by Mr. Stark that in the area involved, there are 245 stairs, with 856 lights; and one of the greatest arguments in favour of electricity was that the department could switch the lights on and off. The same speaker reminded the Council that they had entered into an agreement with the Gas Commissioners to light the common stairs by incandescent gas-lights at a cost of 17s. 6d. per light per annum. The rate for electricity per lamp of 5-candle power would be 21s. per annum. The speaker held that the adoption of electricity was a forward movement, from a sanitary point of view. Mr. Lyon, a member of the Gas Commission, pointed out that by the adoption of this policy they would be faced with an increase of 2000 lights. It was a serious question. The charge amounted to 50 per cent. more than was now being paid. He moved that the stairs be lighted by incandescent gas; and, by 37 votes to 6, the recommendation was adopted by the Council.

In the Hamilton Town Council on Monday, the Gas Committee reported that the Town Clerk had informed them that he had written to the Burgh Assessor, drawing his attention to two decisions by the Commissioners of Inland Revenue, in appeals by gas companies, in which deductions for depreciation were allowed; and that the matter was receiving the attention of the Assessor. The Committee also reported that they had resumed consideration of the complaints as to smoke and dust emanating from the gas-works, and had continued the remit to a Sub-Committee to take the best possible steps to avoid any nuisance. After discussion, the report of the Gas Committee was adopted.

On Monday, the Dean of Guild Court of the burgh of Inverkeithing passed plans for extensions to the works of the Gas Company. It is proposed to erect an additional gasholder, of 25,000 cubic feet capacity; a new retort-house (the present retort-house to be converted into a coal-store), and other buildings and plant, at an estimated cost of £1500. The Engineer for the proposed works is Mr. H. O'Connor, F.R.S.E., of Edinburgh. Negotiations have been in progress for some time with the Earl of Elgin, and other coterminous proprietors of ground, for the acquisition of land. The proposed extensions are being made in view of the large increase of population which is expected in the district consequent upon the construction of the Naval base at Rosyth.

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In the Arbroath Town Council on Monday, it was stated in the minutes of the Gas Committee that they had had a report before them by the Convener and the Manager upon the tenders for coal. Bailie Smith, the Convener of the Committee, explained that there was an increase all over of 6d. per ton, which would amount in the year to £250. The minutes were adopted.

The Stonehaven Town Council, who, in December last, appointed a Committee to consider and report upon a proposal to acquire the transfer of the gas undertaking, have resolved that nothing be done in the meantime in the matter of a transfer.

The recommendation came before the Town Council of Perth on Monday that a deputation be sent to Derby, Leicester, and Fulham to examine and report upon types of charging machinery in use there. Mr. Wright moved that the subject be delayed. They had, he said, during the past eight years, incurred £62,000 of capital expenditure, and he thought it was time that the Council tried to keep down outlay. The recommendation was adopted by 15 votes to 10.

The Committee of the Helensburgh Town Council who have been considering the subject of the extension of the Corporation gas-works have, it is announced, all but completed their labours. It is understood that the scheme which they have resolved to recommend will involve an expenditure of £11,000 or £12,000.

In the Glasgow Town Council on Thursday, Mr. D. M. Stevenson moved approval of the minutes of the Special Committee which had been appointed to make arrangements for the holding of an exhibition of up-to-date appliances for lighting, heating, and cooking. The minutes were adopted, and permission was given to name the exhibition the Glasgow Smoke Abatement Exhibition.

The Kirkintilloch Town Council have had before them a proposal to introduce a turbo "booster" for the improvement of the gas pressure. The new gasholder of 500,000 cubic feet capacity, it was stated, could be emptied to the extent of one-third only. An alternative proposal was made that a small holder should be erected; but it was pointed out that a booster would still be required. The Council resolved to instal the booster, which, it is estimated, will cost about £218.

Salisbury Water Supply.—The ceremony of opening the new water-tower on Bishop's Down, Salisbury, was performed a few days ago by the Mayor (Mr. F. Shepherd). When the boundary of the city was extended, some few years ago, the Corporation purchased three small sources of water supply. One was immediately discarded, another was abandoned nearly two years ago, and the recent ceremony marked the closing of the third, which was bought from the old Milford Water Company. The whole of the Corporation supply will in future be derived from the deep wells at the pumping-station. The new tank will hold 5000 gallons; and it stands 62 feet higher than the adjoining reservoir. The scheme was prepared by the City Engineer (Mr. W. J. Goodwin), who supervised the erection of the tower and laid the main in connection with it.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *April* 16.

Demand has been fairly well sustained throughout the week, and prices have been about maintained; the closing quotations being £12 2s. 6d. per ton f.o.b. Hull, £12 5s. per ton f.o.b. Liverpool, and £12 5s. per ton f.o.b. Leith. Home demand has been particularly good, and in some districts prompt supplies have hardly been enough to meet it. The forward position has not attracted much attention, though at some points something under £11 17s. 6d. per ton would probably be accepted for July-December delivery.

Nitrate of Soda.

This article is easier on spot Liverpool; the quotations now being 9s. 7½d. per cwt. for 95 per cent. and 9s. 10½d. for refined quality, less 2½ per cent.

Tar Products. LONDON, *April* 18.

The markets for tar products have been firm throughout the past week. Pitch closes decidedly firmer; and there are indications that even a higher price will be paid before the present season has finished. Creosote is steady, but there is not much business doing. Benzol, 90 per cent., is very firm indeed for prompt delivery, but for the last six months in the year there is a tendency to sell at slightly lower prices. Fifty-ninety per cent. benzol is also very firm, and appears to be in particular request. Toluol is scarce, and there are eager buyers for delivery to the end of the year. Solvent naphtha is very firm indeed, and business is reported to the end of the year at excellent figures. Carbolic acid is quiet; but there is some desire to purchase for July-December on the part of Continental consumers. Crystals are still neglected, and are offering at low figures. Liquid carbolic is steady, and there is a fair amount of demand for same, especially for the summer months. Naphthalene is unchanged; and creosote salts are in good demand. Tar is fetching good prices.

The average values during the week were: Tar, 16s. 9d. to 20s. 9d., *ex* works. Pitch, London, 34s. to 35s.; east coast, 34s. to 34s. 6d.; west coast, 34s. to 35s. f.a.s., 35s. f.o.b. Benzol, 90 per cent., casks included, London, 8d. to 8¼d.; North, 7¾d. to 8d.; 50-90 per cent., casks included, London and North, 9d. Toluol, casks included, London, 10½d.; North, 10d. to 10½d. Crude naphtha, in bulk, London, 4¼d. to 4⅜d.; North, 4¼d. to 4⅜d.; solvent naphtha, casks included, London, 1s. 3½d. to 1s. 4d.; North, 1s. 4d. to 1s. 6d.; heavy naphtha, casks included, London, 1s. to 1s. 1d.; North, 11d. to 1s. Creosote, in bulk, London, 2⅛d. to 2⅜d.; North, 2d. to 2⅛d. Heavy oils, in bulk, 2¾d. to 2⅞d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0½d.; west coast, 1s. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

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One word more, and that in heavy type because it is important—

MAINTENANCE.

The Davis Gas Stove Co., Ltd., Luton.

Sulphate of Ammonia.

The market for this article has been quiet during the past week, and closes dull. The principal Gas Companies quote £12 7s. 6d. for prompt, and £12 10s. for forward; while outside makes upon Beckton terms are £11 17s. 6d. to £12. Ordinary London f.a.s. terms are about £12. In Hull, the market is £12 2s. 6d. to £12 5s.; and in Liverpool, £12 5s. In Leith, £12 5s. to £12 7s. 6d. is quoted.

COAL TRADE REPORTS.

Northern Coal Trade.

There is now a fuller demand for coal for export; but the starting of some of the collieries that have been idle has increased the production, so that the demand is well met. In the steam coal trade, the tone is easy, through the anticipation of a fuller supply. Best Northumbrian steams are from 11s. 6d. to 11s. 7½d. per ton f.o.b.; second-class steams are 10s. 6d. to 11s.; and steam smalls are steady at about 6s. 6d. to 7s. 6d. In the gas coal trade, the home consumption shows the falling off that is usual at this time of the year; but the exports are heavier. Durham gas coals vary in price from 10s. 3d. to 11s. 1½d. per ton f.o.b. for the usual kinds, according to quality; while for "Wear specials," up to 11s. 6d. is quoted. Some small contracts for export are reported, at prices that are near the current values. A contract for Aarhuus, for special kinds, is booked at about 14s. 9d. delivered there; and another for Randers is at about 15s. 3d., so that, after allowing for freight, &c., the price f.o.b. will not be very far short of the current quotation. Coke is steady, with gas coke from 14s. to 14s. 6d. per ton f.o.b.—the output of gas coke being now smaller.

Scotch Coal Trade.

The market has been quieter, and prices have had an easier tendency for the smaller sorts, the others remaining where they were. The quotations now are: Ell, 9s. 6d. to 10s. per ton f.o.b. Glasgow; splint, 10s. to 10s. 6d.; and steam, 9s. 6d. to 10s. The shipments for the week amounted to 319,533 tons—a decrease of 46,243 tons upon the previous week, but an increase of 20,726 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,081,435 tons—an increase of 671,962 tons compared with 1909.

Imperial Continental Gas Association.—The accounts to be presented at the half-yearly general meeting of the Association on the 3rd prox. show that the profit for the six months ended Dec. 31 last amounted to £213,853. This added to the balance brought forward (£33,445) makes a total of £247,298. As already announced, the Directors recommend a dividend of 4 per cent. for the half year, tax free.

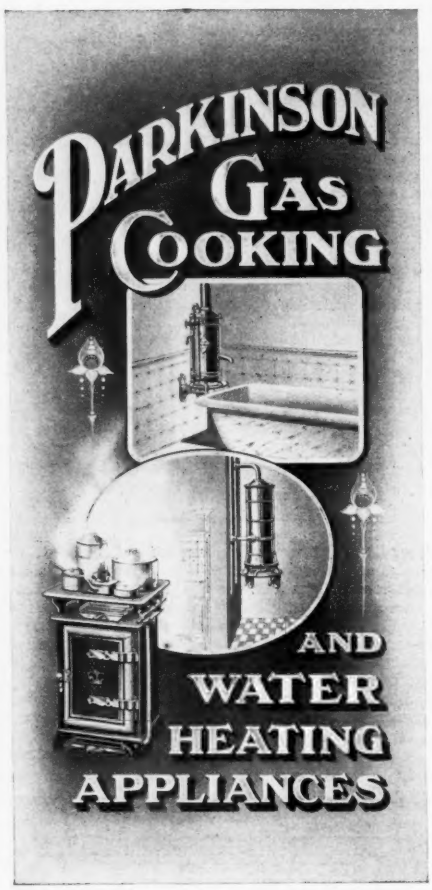
Gas-Meter Testing in Bristol.—Of 584 gas-meters tested in Bristol during last quarter, 456 were found to be incorrect; 24 of these, or 5·26 per cent., registering in favour of the seller, and 432, or 94·74 per cent., in favour of the consumer. The average percentage of error in incorrect meters in favour of the seller was 3·65, with a maximum of 9 89; while the percentage of those registering in favour of the consumer was 9·43, with a maximum of 37·89.

Embezzlement Charge against a Gas Official.—Last Thursday, at Stratford-on-Avon, Ernest Clarke, an official of the Corporation, was committed for trial on charges of embezzlement and the falsification of accounts. The accused had been employed in the Gas Department for over twenty years, and was trusted implicitly. About £25,000 passed through his hands each year. It was alleged that defalcations exceeding £300 had already been discovered.

Holsworthy Water-Works.—A Local Government Board inquiry was held at Holsworthy last Friday with reference to an application by the District Council for power to borrow £2400 for works of water supply. It was explained that a loan of £4700 was raised for a water scheme; but the works cost more than £2000 beyond this sum. The main reason for the excess in expenditure was an increase in the size of the reservoir. Mr. Chadwick, the Engineer for the scheme, said the contract was £421 in excess of the original estimate, while additional mains had cost £623 and extra excavation on account of peat £564.

Primitiva Gas and Electric Lighting Company of Buenos Aires.—The accounts for the past year which will be presented to the shareholders at the annual general meeting on Friday show at the credit of profit and loss account a sum of £129,772; making, with the balance brought forward, a total of £156,675. After deducting interest paid on debentures, and the dividends paid on the preference and ordinary shares, &c., there remains £75,323, out of which the Directors recommend a final dividend of 4s. 6d. per share, tax free, on the ordinary shares; making 7 per cent. for the year. This will absorb £18,000, and leave £57,323 to be carried forward. The Company's mains, services, &c., were very considerably extended during the year, and the works kept in efficient repair. It is proposed to alter the Company's name to "Primitiva Gas Company of Buenos Aires, Limited," in view of the fact that some time ago they relinquished the electricity section of the business to the German Transatlantic Electricity Company.

Gas Profits at Rhyl.—At the last meeting of the Rhyl District Council, the Chairman of the Gas Committee (Mr. S. Perks) gave some particulars as to the progress of the gas undertaking. He said that the original works came into the hands of a private Company in 1869, when the output was about 3 million cubic feet of gas, and the net profits were £637. In 1882, the Council acquired the works under an Act of Parliament; and at that time the output was 22 millions, and the profits were £1900 per annum. The Council paid for the concern £35,000, or 18 years' purchase. During the past year the works had produced 60 million cubic feet of gas, and the Committee were able to hand over to the relief of the rates, after providing for the sinking fund, £1700. Further than this, while in 1892 the output of gas per ton of coal carbonized was 10,200 cubic feet, to-day it was 11,508 cubic feet. He considered that the works, as a commercial concern, were now worth £135,000, compared with the £35,000 paid for them 18 years ago, and the splendid paying concern they had proved to be was largely due to the careful management of the Engineer, Mr. L. G. Hall. Mr. Hall's services were acknowledged in a cordial resolution.



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Marseilles Water Supply.—According to some particulars in a recent number of the "Surveyor," the average daily consumption of water in Marseilles is 26,400,000 gallons, which is equal to 66 gallons per head of the population. There are four reservoirs—one being for storage and the rest for supply. The first is situated at the top of a hill, 243 feet above sea level; and it will hold about 440 million gallons. The largest supply reservoir will contain 330 million gallons; and the other two will hold 77 and 27½ million gallons respectively.

The Gas Committee of the Stalybridge Town Council have decided to hand out of profits a sum of £1944 in relief of the rates.

An inquiry has been held on behalf of the Local Government Board with respect to an application of the Rhondda Urban District Council for permission to borrow £11,000 for their gas undertaking and £2000 for works of water supply.

A project is on foot to form a company for supplying water to Chiddingfold, near Godalming; and the Hambledon Rural District Council have expressed their willingness to render the promoters such assistance as they reasonably can.

The Gas Committee of the Wells Corporation, having in view the results realized by the gas undertaking for the past year, propose that 5d. per 1000 cubic feet be deducted from the present discount price of 4s. 2d.; making the net price 3s. 9d.

Messrs. Davis Bros., of Manchester, have just placed on the market a new and improved machine, based on some novel principles, for measuring out and mixing together any number of dry powders. It is claimed for the machine that it performs in a reliable and continuous fashion a number of operations which hitherto have been done intermittently, and with the expenditure of much time and manual labour. The essential feature of the "Apportioner," as the appliance is called, is a tapered screw, or, more strictly, a helix on a tapered barrel, revolving in a cylinder forming the lower portion of a hopper. By the use of this screw to regulate the flow of each material, the separate weighing or measuring and mixing of the ingredients have been superseded, for the materials are here drawn simultaneously in continuous streams from their respective hoppers; the flow of each stream being regulated solely by the position of the screw relative to the hopper, which it is easy to adjust to the greatest nicety.

The Burton-upon-Trent Corporation Gas Department have placed with the Richmond Gas Stove and Meter Company, Limited, an order for 1000 cookers for use with prepayment meters.

It is estimated that the profits of the Gas Department of the Macclesfield Corporation for the year ended the 31st of March will amount to about £500 more than last year, when the net profits reached £6057. The Gas Committee have decided to allocate £500 to the maintenance fund; so that if the forecast is correct, there will be about £6000 available for the relief of the rates.

A poll has been taken of the parochial electors of Norwood Green and Coley on the question of the partial lighting of the two districts with gas. A previous proposal to use electricity had been rejected on account of the excessive cost; and now it was suggested that fourteen gas-lamps should be erected in the village street at Norwood Green and six at Coley, the cost being estimated at about £200, and involving a 6d. rate. In favour of lighting, there were 27 votes; and 56 against. It is expected that this experience will end for some time the agitation which has been in progress for lighting the streets of the combined villages.

A lecture on "Gas and Its Uses" was lately delivered by Mr. William Titley, F.C.I.S., the Secretary of the Guildford Gas Company, before the local Chamber of Trade. The author illustrated his remarks with a number of up-to-date appliances, samples of coal-tar products, &c. He said that upwards of 189,000 million cubic feet of gas were consumed annually in the United Kingdom; and to produce this, more than 15 million tons of coal were carbonized, in addition to a considerable amount of other raw materials. To convey the gas to the consumers, about 30,000 miles of trunk mains had been laid in the ground. The manufacture of such a large quantity of gas, and its distribution, provided employment for over 100,000 men. Dealing with the uses of gas, he spoke of their indebtedness to the inventor of the incandescent mantle, and mentioned that the first mantle used in the neighbourhood was installed at Charterhouse School, Godalming, and cost 15s. Mr. Titley produced a French journal, published in 1824, which contained a paragraph announcing that gas-pipes were being laid at Guildford. Comparing the price of gas in Guildford now with that of former days, he said that from 1824 to 1844 the net charge per 1000 cubic feet was 15s.; when he came to Guildford 32 years ago, it was 5s.; and to-day, it was 2s. 11d. During his connection with the Company, the manufacture had increased from 30 million cubic feet per annum to 200 millions. The lecturer was accorded a hearty vote of thanks.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER. Rainhill Gas and Water Company. Applications by April 21.
MANTLE CHEMIST. No. 5225.
REPRESENTATIVE. No. 5220.
DRAUGHTSMAN. No. 5227.
TRAVELLER. No. 5223.
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METER REPAIRERS. Consumers' Gas Company, Toronto.
STOKER. No. 5224.

Plant, &c. (Second Hand), for Sale.

EXHAUSTERS AND STEAM ENGINES, &c. Smethwick Gas Department.
STATION METER. R. Laidlaw and Son, Edinburgh.

Stocks and Shares.

CHIGWELL, &c., GAS COMPANY. May 3.
HARROW AND STANMORE GAS COMPANY. May 3.
HORLEY GAS COMPANY. May 3.
LEA BRIDGE GAS COMPANY. May 10.
SOUTHEND GAS COMPANY. May 3.
WALTHAM ABBEY, &c., GAS COMPANY. May 3.

TENDERS FOR

Benzol.

BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by April 25.
FOR EXPORT TO THE CONTINENT. No. 5226.

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BLACKPOOL GAS DEPARTMENT. Tenders by April 24.
MONTROSE GASLIGHT COMPANY. Tenders by April 27.
MOSSLEY GAS DEPARTMENT. Tenders by May 2.
PAIGNTON GAS COMPANY. Tenders by May 7.

Gasholder.

SALFORD GAS DEPARTMENT. Tenders by April 28.

Pitch. No. 5221.

Tar and Liquor.

RHYL GAS DEPARTMENT. Tenders by April 27.
ULVERSTON GAS DEPARTMENT. Tenders by April 28.

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WANTED, a Stoker for a Lancashire Boiler in a Factory near London. Must be steady and industrious. Preference given to a Man used to Distilling and Condensing Plants. Wages 32s. per week.
Apply, by letter only, to No. 5224, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GENERAL Foreman wanted for a Gas- Works, in the North of England, making 120 Millions per Annum. Must be a good Carbonizer and Capable of Working Carburetted Water Gas and Sulphate of Ammonia Plants. House provided on Works.
Applications, by letter only, stating Age, Experience, and Wages Required, with *copies* of recent Testimonials, to No. 5222, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

REQUIRED, by a well-known Firm of Gas Apparatus Manufacturers for London and Suburbs, the Services of an up-to-date TRAVELLER with a sound Connection among Gas Companies and Good Class Ironmongers. Permanency. Salary no object to the Right Man.
Apply, by letter only, stating full Particulars, in confidence, in the first instance, to No. 5223, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CANNOCK, HEDNESFORD, AND DISTRICT GAS COMPANY, LIMITED.
WANTED, a Young Man to act as WORKING FOREMAN, who is accustomed to Generator and Regenerator Furnaces, General Yard Work, Main and Service Laying, Fitting, and able to Supervise the Works in the absence of the Manager.
Applications, stating Age, Wages required, and enclosing *copies* of Three recent Testimonials, to be addressed to the Manager, Gas-Works, Cannock.

RAINHILL GAS AND WATER COMPANY.
THE Directors of the above Company are prepared to receive APPLICATIONS for the Position of MANAGER of the above Works.
Applications, stating Salary, Age, and Experience, may be sent to the undersigned not later than Thursday, the 21st inst.
Free House, Coal, and Gas.
Canvassing not allowed.
Fred. Pritchard,
Secretary.
Gas Office, Huyton,
Near Liverpool.

PITCH—12,000 Tons wanted. This Season's delivery.
Firm Quotations f.o.b. English Port, stating Quantity, to No. 5221, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Set of Four Purifiers, about 30 feet Square, with Valve and Connections.
Full Particulars with Lowest Price to Firth Blakeley, Sons, and Co., Ltd., Thornhill, Dewsbury.

COUNTY BOROUGH OF SMETHWICK.
(Gas Department.)
SECOND-HAND EXHAUSTERS AND STEAM-ENGINE.
THE Gas Committee of the Corporation of Smethwick have for DISPOSAL Two DONKIN EXHAUSTERS, with STEAM-ENGINES Combined, including Disc Valves, nominal capacity 40,000 and 60,000 Cubic Feet per hour respectively; also a HORIZONTAL HIGH-PRESSURE STEAM-ENGINE 14-inch Bore, 20-inch Stroke, to work at 80 lbs. Steam-Pressure.
For an Immediate Sale, a low Price will be taken.
The Plant can be seen at the Gas-Works, Rabone Lane, at work during the next Two or Three Weeks; and any further Particulars can be obtained on Application to Mr. Vincent Hughes, Engineer, at the Gas-Works.
W. J. Sturges,
Secretary.
Gas Department, Council House,
Smethwick, April 12, 1910.

GASHOLDERS—Splendid 45 feet diameter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.

FIRTH BLAKELEYS, Thornhill, DEWSBURY.

FOR SALE—A Station Meter in Square Cast-Iron Case, to pass 60,000 Cubic Feet of Gas per Hour. Can be fitted with New Drum if necessary and made equal to a New Meter. A low Price will be accepted.

Address R. LAIDLAW AND SON (EDINBURGH), LIMITED, LONDON and EDINBURGH.

COUNTY BOROUGH OF BLACKPOOL.

THE Gas Committee are prepared to receive TENDERS for the Supply of GAS COAL or COBBLES to May 1, 1911.

Tenders to be endorsed outside, and addressed to the Chairman, by the 24th day of April, 1910.

Forms of Tender may be had from the undersigned.

JOHN CHEW,
Gas Engineer.

Gas Office, Princess Street,
April 7, 1910.

RHYL URBAN DISTRICT COUNCIL.

TENDERS FOR TAR AND LIQUOR.

THE Rhyl Urban District Council are prepared to receive TENDERS for all Surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Year ended June 30, 1911.

Full Particulars may be obtained from Mr. Leonard G. Hall, Assoc.M.Inst.C.E., Engineer and Manager, Gas-Works, Rhyl.

Sealed Tenders, endorsed "Tender for Residuals," must be delivered to me not later than April 27, 1910.

The lowest or any Tender not necessarily accepted.

ARTHUR ROWLANDS,
Clerk to the Council.

April 7, 1910.

ULVERSTON URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS.

THE Gas and Water Committee are prepared to receive TENDERS for the Purchase of the Surplus TAR produced at their Works during the Year commencing the 1st of July next.

Further Information and Forms of Tender may be had on Application to the undersigned.

Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas and Water Committee, to be sent in not later than Thursday, the 28th inst.

The Committee do not bind themselves to accept the highest or any Tender.

JNO. SWAN,
Engineer and Manager.

BRIDGEWATER COLLIERIES COKE-WORKS.

(THE EARL OF ELLESMERE.)

TENDERS are invited for the Crude BENZOL produced at the above Works (estimated at 8000 to 10,000 Gallons per Month) testing 80 per cent. at 120° C., during the next Three, Six, Nine, or Twelve Months, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway, or at the Brackley Siding on the Little Hulton Mineral Branch of the London and North Western Railway.

Tenders, endorsed "Tender for Crude Benzol," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Offices, 4, Chapel Walks, Manchester, not later than the 25th inst.

Manchester, April 5, 1910.

MONTROSE GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the Supply of about 3000 Tons of Best Quality Screened GAS COAL, and WASHED NUTS f.o.r. or f.o.b. Firth of Forth Ports, in such Quantities as may be required till the 31st of May, 1911.

Sealed Tenders, addressed to the undersigned and endorsed "Tender for Coal," to be sent in not later than Wednesday, the 27th day of April.

The Directors reserve to themselves the right to divide the quantity into Two or more Contracts, and do not bind themselves to accept the lowest or any Offer.

By order,
A. MACKAY,
Engineer and Manager.

Montrose Gas Offices,
April 14, 1910.

PAIGNTON GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Paignton Gas Company are prepared to receive TENDERS for the Supply of 5000 Tons of best approved GAS COALS, to be delivered in such Quantities and at such times as may be required, and to weigh 20 cwt. to the Ton over the Gas Company's Weigh Bridge.

Tenders to be accompanied by Practical Working Analysis, stating the Price of Coal delivered at Paignton Station, Great Western Railway, free of all Charges.

Forms of Tender are not supplied.

The Directors do not bind themselves to accept the lowest or any Tender.

Further Particulars may be obtained from Mr. C. G. Dawson only.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of Coal, to be sent on or before the 7th day of May next addressed to the undersigned at the Gas Offices, 1a, Victoria Street, Paignton.

F. W. PUDDICOMBE,
Secretary.

Paignton, April 14, 1910.

BOROUGH OF MOSSLEY.

THE Gas Committee of the Borough of Mossley invite TENDERS for the Supply of Screened GAS COAL.

Specifications and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Gas Coal," and addressed to the Chairman of the Gas Committee, Gas-Works, Mossley, must be delivered not later than the first post on Monday morning, May 2, 1910.

JAMES TAYLOR,
Engineer and Manager.

Gas-Works, Mossley,
April 18, 1910.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply and Erection of a TWO-LIFT GAS-HOLDER, 100 feet in diameter, required at their Bloom Street Works.

The Drawings may be seen, and *copies* of the Specification and Form of Tender (for which a charge of £1 1s. will be made, to be returned on receipt of a *bonâfide* Tender) obtained on Application to Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Gasholder," to be delivered to me not later than Three p.m. on Thursday, the 28th of April, 1910.

L. C. EVANS,
Town Clerk.

Town Hall, Salford,
April 15, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late H. J. Rydon, Esq.

GAS STOCKS AND SHARES,

of the CAPITAL VALUE of upwards of £10,000

IN THE

HARROW AND STANMORE GAS COMPANY,
SOUTHEND GAS COMPANY,
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY,
HORLEY DISTRICT GAS COMPANY.
WALTHAM ABBEY AND CHESHUNT GAS AND COKE COMPANY.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 3, at Two o'clock, in Lots.

Particulars of H. W. RYDON, Esq., Solicitor, 77, Cornhill, E.C., and of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

LEA BRIDGE DISTRICT GAS COMPANY.

ISSUE OF £14,000 NEW CAPITAL COMPRISING:
£4000 Four per Cent. Perpetual Debenture Stock,
£5000 Five per Cent. Preference Stock,
£5000 Consolidated Ordinary Stock.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 10, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

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of the Edinburgh and Leith Corporations' Gas Commissioners,

Their Design, Construction, and Equipment, with Illustrations, Plates, and Details of Costs.

By W. R. HERRING, M.Inst.C.E., &c.

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Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

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Class A lifts 24 ft.
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GRASSMOOR COLLIERIES,

CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

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Offers are invited from Firms only who are *bonâ-fide* in a Position to enter into a Contract for the above quantity.

Address, in first instance, No. 5226, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
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UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
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LONDON: 16, Park Village East, N.W.

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COKE SELLING . . AT 11/6 A TON
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IN THE SAME TOWN.
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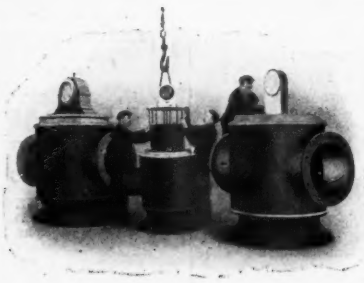

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"SHELL BRAND" (Pure) PAINTS
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1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

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From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

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Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, LEADENHALL STREET,
LONDON, E.C., September 21st, 1909.

DEAR SIRS,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·08	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
,, ,, ,, 1050° C.	4·76%
,, ,, Total	8·46%
Volume shrinkage at 100° C.	10·7 %
,, ,, ,, 1050° C.	12·6 %
,, ,, Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. to 3362° F. (SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

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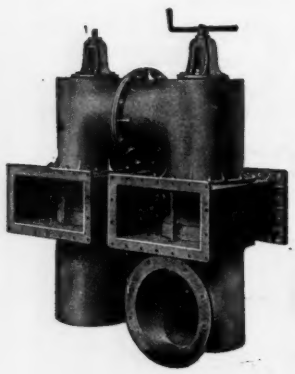
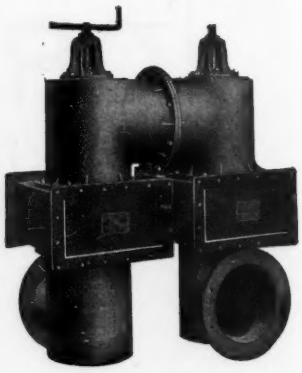


Purifier Valves

fixed inside or outside the Purifiers.



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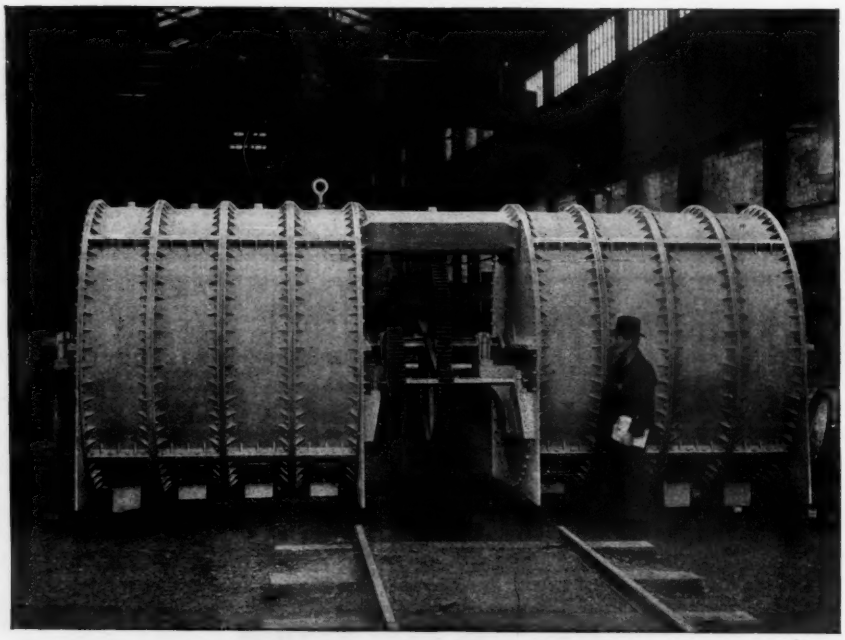

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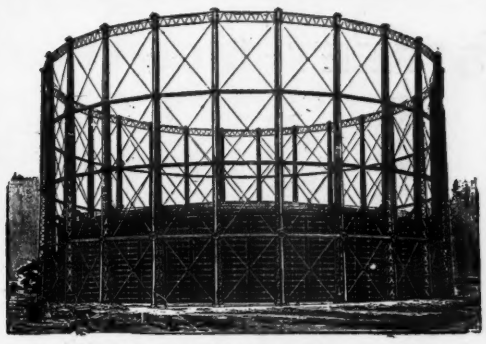

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Aggregate capacity of Plant supplied 231,600,000 cubic feet daily.

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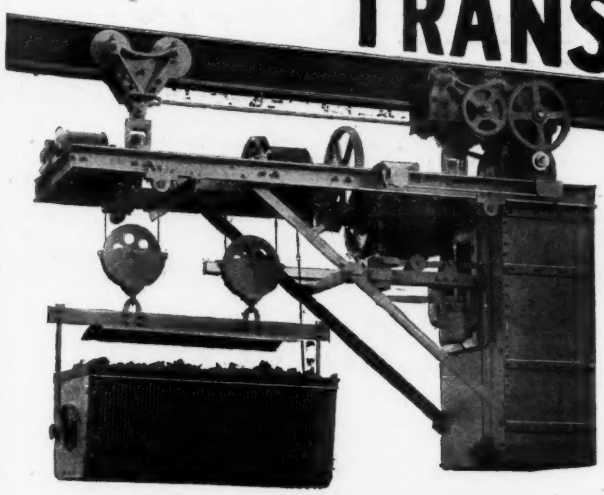

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Large Gas Ways, Balanced Valves, also High-Pressure Diaphragm Governors.

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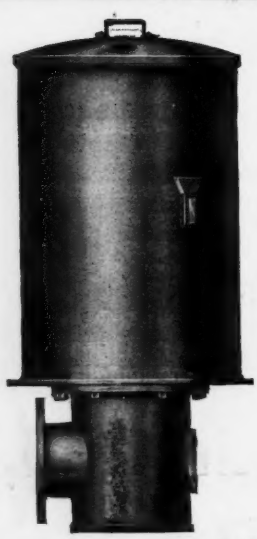
AN EPOCH IN GAS MANUFACTURE.
THE VERTICAL GAS RETORT SYNDICATE, LIMITED,
(DESSAU SYSTEM)
17, VICTORIA STREET, WESTMINSTER, S.W. (*See Full Page Advertisement, p. I., Nov. 30.*)



RETORT HOUSE GOVERNORS.

THESE Governors are made to prevent fluctuation in the Pressure or Exhaust in the Hydraulic Main by controlling the Gas entering the Governor, notwithstanding the constant varying quantity of Gas coming from the Retorts. This enables the Seal of the Dip Pipes to be reduced to a minimum with perfect safety, and an increase in the make of Gas per Ton of Coal is thereby assured.

There is absolutely no possibility of any sticking, due to deposits of Tar or Pitch, with this Governor, as the Cone is quite free to pass through the Seat. The Regulation by means of a long Parabolic Cone is recognized as the most exact method that can be employed. A great improvement, first introduced by Messrs. JAMES MILNE & SON, LIMITED, is the simple arrangement by which a smaller Cone and Seat can be easily fitted, thus ensuring delicate adjustment during a period of small makes.

PRICES AND SIZES ON APPLICATION.

JAMES MILNE & SON, LIMITED,
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Welsbach LIGHT

Inverted Arc Lamp, Fig. 623.

Storm Proof—

For Exterior Lighting.

Welsbach-Kern

(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

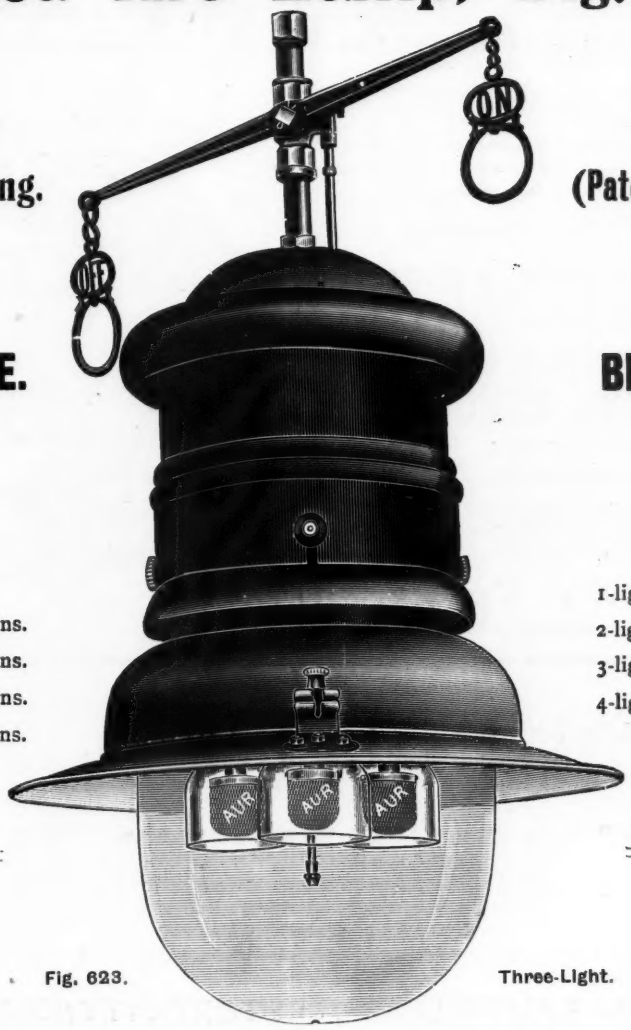

Fig. 623. Three-Light.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*		*1-Light.*	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**	Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**	Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made
Case contains . .	*80*	*18*	*18*	*12*	Welsbach Mantles, each **6d.** subject as usual.				

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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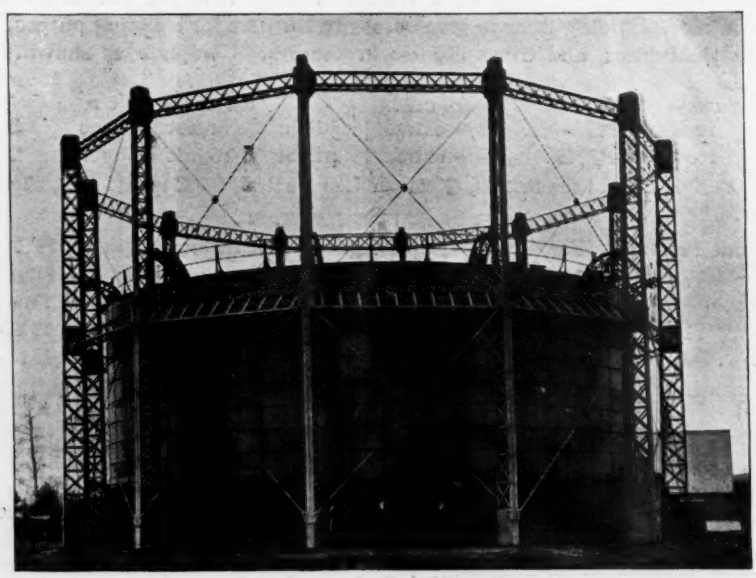

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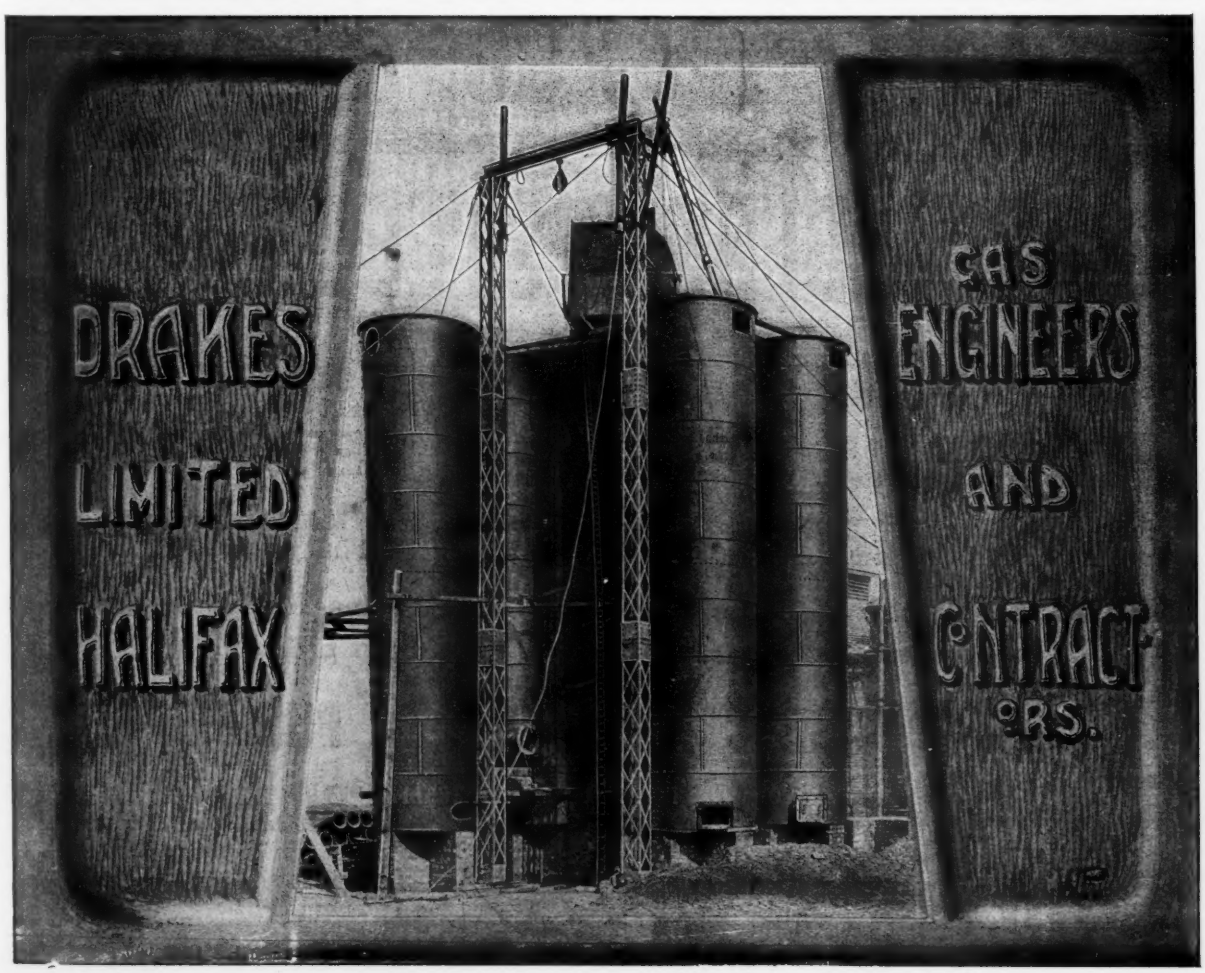

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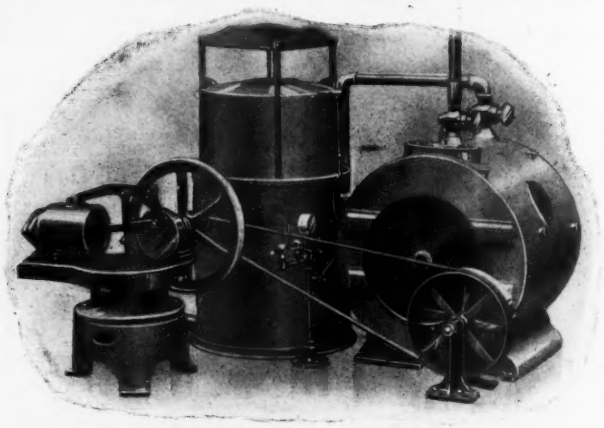
Plants from 100 cub. ft. per hour up to 50,000 cub. ft. per hour for Gas Works.



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